THE UNIVERSITY OF ALBERTA

THE MALE AND FEMALE GENITALIA OF NORTH AMERICAN PENTATOMOIDEA (HEMIPTERA: HETEROPTERA): MORPHOLOGY AND BEARING ON CLASSIFICATION

by

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled "The male and female genitalia of North American Pentatomoidea (Hemiptera: Heteroptera): morphology and bearing on classification" submitted by Frederick J. D. McDonald in partial fulfilment of the requirements for the degree of Doctor of Philosophy.

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ABSTRACT

The male genitalia of 85 and the female genitalia of 80 species of North American pentatomoid bugs are described. Several changes in nomenclature at the generic level are suggested. The male genitalia were found to vary very widely in the tribes Pachycorini and Odontosclerini of the Scutellerinae. The female genitalia were somewhat more uniform. Species in the tribe Scutellerini are very easily defined on the basis of both the male and female genitalia. The Pentatominae, Asopinae, and Podopinae are very uniform in the structure of the genitalia and are closely related to one another. The spermatheca of all species examined in the above subfamilies except <u>Trichopepla semivittata</u> (Say) (Pentatominae), had an elongate membraneous dilation with a central sclerotized rod. The presence of median penal lobes is restricted to the Pentatominae, Asopinae and Podopinae with the exception of one scutellerine, <u>Symphylus carribeanus</u> (Kirkaldy). The Cydnidae exhibited great diversity of form both in the male and female genitalia. The status of this family will remain obscure until further species have been examined. The Acanthosomidae possess pentatomine type genitalia. <u>Piezosternum subulatum</u> (Thunberg) has genitalia of very aberrant type, not resembling

greatly other species of the Tessaratomidae so far described. On the basis of this work it is suggested that the Scutellerinae be accorded family status; the Asopinae and Podopinae should be reduced to tribes within the Pentatominae; the Acanthosomidae reduced to subfamily status within the Pentatomidae and Piezosternum should be raised to subfamily status within the Tessaratomidae. Phylogenetically the Pentatomoidea show some relationship to the lygaeoid group, but this relationship is not close. The two groups are probably derived from a common ancestor. The Tessaratomidae are an early offshoot of the hypothetical pentatomoid ancestor. The main stock then developed into the Scutelleridae and the Pentatomidae with the Acanthosominae a very early offshoot of the latter group.

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1. GENERAL INTRODUCTION

The present study was undertaken with the hope of showing more clearly the interrelationships of the North American genera of the Pentatomoidea. However many more problems have been raised than solved. I hope that even though few rays of light have been cast on the classification of the Pentatomoidea, the present work will provide some basis for a thorough taxonomic revision of this group in the future. Both the male and female genitalia provide good taxonomic characters and they will no doubt be used with increasing frequency especially where large numbers of characters are required for analytical purposes as in the rapidly developing field of numerical taxonomy.

Fairly detailed descriptions have been made of the male genitalia while the female genitalia have been treated rather more generally. A discussion of the results in each section of the work has been given with a final overall synthesis of all points raised. The classification I have proposed cannot be regarded as final any more than any other classification, but, in general, it supports classifications proposed by previous workers. A satisfactory classification will depend on a thorough analysis of this super-family on a world-wide basis.

2. METHODS AND MATERIALS

The specimens used in this work were selected from dried museum material; 85 species of male and 80 species of female pentatomoid bugs were studied and a total of 256 specimens were examined. Representatives of the type species of each genus were chosen wherever possible in case nomenclatural changes are involved.

The genitalia were studied after treatment with 10% KOH in the usual way. The terminalia were cleared in polyvinyl lactophenaol, methyl salicylate or glycerine. Wherever necessary, Chlorazol black was used as a stain for membraneous structures. In some cases the internal structure of the vesica could only be studied after thorough bleaching in chlorine (McDonald 1961). A technique described by Kumar (1964) was used to check the connections of the internal ducts of the vesica. This method was not found to be entirely satisfactory.

Transverse sections of the vesica of <u>Lampromicra senator</u> (Fabricius) and <u>Cantao parentum</u> (White) were made. The vesica was embedded in paraplast, sectioned at 6μ, stained in Mallory's triple stain and mounted in Canada balsam.

Observations were made with a Wild and a Leitz stereoscopic microscope with magnifications of up to 50X and 150X respectively. Diagrams were drawn to scale using a squared ocular grid and squared paper.

Stippling where used indicates sclerotization; in most cases the density of stippling does not indicate the degree of sclerotization. The conjunctival appendages have been numbered in sequence from the dorsal to ventral surface; the third are thus always ventral in position. The diagrams of the vesica have nearly all been orientated so that the seminal duct is ventral.

The classification of the Pentatomoidea throughout the descriptions and discussion sections follows that of Leston (1953c). The keys are arranged according to the proposed classification I have set out in section 6.4.

The generic and specific names followed are those of Van Duzee (1917), with Kirkaldy (1909) as a second source of reference.

Whenever structures are compared, by definition an estimation of the similarities and differences between the structures has to be made. The evaluation of similarity and difference at once leads us into a great deal of difficulty. The observation and interpretation of characters in common, play a large and essential part in evolutionary taxonomy (Simpson, 1961). One of the basic problems is to distinguish between the various kinds of similarities and particularly those that are and those that are not inherited from a common ancestry. I have adopted Simpson's (1961) definition of homology which is as follows:

"Homology is resemblance due to inheritance from a common ancestry". This theoretical definition of homology must be carefully separated from the working criteria with which homologous features are recognized (Bock, 1963).

3. TERMINOLOGY

3.1 Male genitalia

The basic nomenclature used is that of Pruthi (1925) with slight modifications. I have retained the term median penal lobe used by Baker (1931) for the inner sclerotized lobes surrounding the vesica in Pentatominae, Asopinae and Podopinae. The homology of these lobes is uncertain. The term ejaculatory duct, used quite wrongly by myself (McDonald, 1961, 1963) for the duct from the ejaculatory reservoir to the secondary gonopore has been replaced by endophallic duct. This I feel is a rather more basic term than conducting canal 2 of Kumar (1964). I also cannot accept the latter author's term conducting chamber in place of ejaculatory reservoir because in most cases outside the highly specialized Scutellerini this chamber is well developed and probably does act as a type of reservoir or holding chamber for sperm.

Figure 1 is a general diagram showing the terminology used in this paper.

3.2 Female genitalia

The nomenclature used in this section is that of Scudder (1959) and Pendergrast (1957) for the spermatheca. For the purposes of this study the spermatheca has been considered as part of the female genitalia.

4. MORPHOLOGY OF THE MALE GENITALIA

4.1 Introduction

The external features of the male genitalia are easily observed. The appendages of the aedoeagus are sometimes difficult to expand and wherever these have not been fully expanded this is stated in the text.

The male genitalia are situated in the ninth segment which is modified into a cup-like structure, the pygophore (Fig. 4). Within the pygophore is a pair of hook-like structures, the claspers (Fig.5) and a tube-like structure, the proctiger (Fig. 4; P.) bearing distally the anus. Lying beneath the proctiger is the aedoeagus (Fig. 1) attached by means of the basal plate (Fig. 1, B.p.) to the ventral surface of the pygophore.

The internal structure of the vesica has been worked out and drawn as accurately as possible. However, without actually sectioning the specimens interpretation of the internal ducts is subject to error and cannot be regarded as final until sections of all species have been made. Even so, the gross morphological details are quite readily observable and these serve very adequately for studies in homologies between genera at a tribal level and above.

The tribe Scutellerini, represented in North America by the genus Augocoris has a peculiarly developed convoluted duct passing back from the entrance of the seminal duct into the ejaculatory reservoir (Fig. 83). Kumar (1964) states that this duct (conducting canal 1) is composed of two sets of canals and that the seminal duct passes directly into this duct. Cross sections of Lampromicra senator and Cantao parentum (Australian scutellerines) show quite clearly that this duct is in fact single but of a highly convoluted nature (Fig. 3). Sections also show that the seminal duct opens into the base of the endophallic duct as does the convoluted duct. Unfortunately, sections could not be made of the genitalia of Augocoris gomesii as very few specimens were available for study.

4.2 Descriptions

4.21 PENTATOMIDAE

SCUTELLERINAE

Odontoscelini

Fokkeria producta (Van Duzee), 1904

(Figs. 4 - 7)

Pygophore. - Dorsal border deeply and evenly arched (Fig. 4; D.b.); ventral border (Fig. 4; V.b.) U-shaped. Pygophoral opening with wide dorsal and lateral flanges. A number of small setae on dorsal and lateral borders.

Claspers. - Small (Fig. 4; Cl.) stem basally wide; apically narrowing into a shallow hook; inner margin finely serrate. A number of setae on mid region of stem (Fig. 5).

Aedoeagus. - Theca conical; not heavily sclerotized (Fig. 6; Th.). Three pairs of conjunctival appendages borne on a common membraneous base; first (Fig. 6; 1C.ap.), conical, membraneous with a small sclerotized apex; second conjunctival appendages (Fig. 6; 2 C. ap.) bifid, consisting of two heavily sclerotized horns born on a short membraneous base; third conjunctival appendages (Fig. 6; 3 C.ap.) large oblong structures apically bluntly rounded, heavily sclerotized throughout and covered with numerous flat, blunt teeth.

Vesica. - Strap-like (Fig. 6; Ve.), dorso-ventrally compressed, base wide, sclerotized, fused to ventral margin of theca, tapering distally, apex membraneous and bent through 90°. Seminal duct (Fig. 7; Se.d.) leading into a small globose ejaculatory reservoir (Fig. 7; E.res.), walls of latter thickened; endophallic duct (Fig. 7; En.d.) connected to anterior end of reservoir, apically terminating within membraneous apex of vesica.

Euptychodera corrugata (Van Duzee), 1904

(Figs. 8 - 12)

Pygophore. - Small (Fig. 8), opening with dorsal and lateral flanges, ventral border emarginate, a number of small setae scattered along the lateral margins.

Claspers. - Shallow hook (Fig. 9), no differentiation between apical hook and stem. A number of stout setae along stem, inner basal margin bearing many minute spines. Dorsal surface of hook scalloped.

Aedoeagus. - Theca small, conical (Fig. 10). Three pairs of conjunctival appendages: first (Fig. 10) basally wide, membraneous, apically produced into a heavily sclerotized point; second (Fig. 10) consisting of heavily sclerotized curved horn attached to a short membraneous base fused to common base; third, (Figs. 10, 11) large, sclerotized plate-like structures, outer surface covered with numerous short stout spines; appendages normally folded within common base beneath second conjunctival appendages.

Vesica. - Narrow and flattened dorso-ventrally (Fig. 10), basally attached to theca; sclerotized except for apical third. Seminal duct (Fig. 12) leading ventrally into anterior portion of bilobed ejaculatory reservoir (Fig. 12; A. ch.). Posterior lobe forming a small chamber lying somewhat on top of larger anterior chamber. A wide endophallic duct (Fig. 12) connecting with

ejaculatory reservoir, apical opening membraneous.

Note. - This set of genitalia resemble very closely those of Fokkeria producta especially in the form of the conjunctival appendages. I think that Euptychodera is probably congeneric with Fokkeria.

Vanduzeeina balli (Van Duzee), 1905

(Figs. 13 - 17)

Pygophore. - Opening with a large flattened flange (Fig. 13; F.) laterally on each side; dorsal margin wide; ventral margin narrow flattened bearing a number of small fine setae. Proctiger (Fig. 13; P.) with numerous long fine setae on apex.

Claspers. - Scythe-like (Fig. 14); stem continuous with apical hook and covered with stout setae (Fig. 14; Se.) along outer margin; a number of longer setae found at base of hook.

Aedoeagus. - Theca small, conical, not heavily sclerotized (Fig. 15). Three conjunctival appendages present, fused onto wide membraneous conjunctiva; first, (Fig. 16) basally membraneous and wide; apically produced into a small curved heavily sclerotized point; second (Fig. 16) completely enclosed by their membraneous common base within theca when not expanded; apex of each appendage terminating in a very large flattened, heavily sclerotized horn; third

(Fig. 16) minute structures situated at bases of second conjunctival appendages; apically sclerotized and pointed.

Vesica. - Small narrow and flattened (Fig. 16), basally sclerotized and fused to conjunctiva; medianly divided into two rounded sclerotized projections lying one on each side (Fig. 17; Pr.) of a membraneous tube, within which is the endophallic duct (Fig. 17). Lateral projections bearing a number of teeth on their apices. Apex of vesica with a wide flange (Fig. 17). Internally, seminal duct (Fig. 17) passing ventrally up base of vesica and into small trilobed ejaculatory reservoir (Fig. 17); endophallic duct straight, basally merging into apex of reservoir.

Phimodera binotata (*P. torpida*)(Say), 1824
(Figs. 18-22)

Pygophore. - Dorsal margin (Fig. 18; D. m.) very broad,covered with fine setae; two small spine-like projections found laterally one on either side on ventral border (Fig. 18) above bases of claspers. Ventral border bearing numerous short stout setae.

Claspers. - Small (Fig. 19), stem drawn out into a blunt apex; a square projection lying below apex forming a shallow hook. Twelve to seventeen setae found along apical half of stem; a number of very minute setae found on under surface of apex.

Aedoeagus. - Theca cylindrical (Fig. 20); apical margin merging into conjunctiva when latter fully expanded. One pair of membraneous cylindrical conjunctival appendages (Fig. 21; C.ap.); apically blunt. Seminal duct (Fig. 22) attached ventrally into base of endophallic duct; a ventral canal (Fig. 22) leads back into a large ejaculatory reservoir (Fig. 22) from which a second dorsal canal (Fig. 22) opens into base of endophallic duct; latter basally thickened and thrown into a number of loops finally widening and opening at secondary gonopore.

Eurygastrini

Eurygaster alternata (Say), 1828
(Figs. 23--26)

Pygophore. - Dorso-lateral border (Fig. 23) rounded extending down laterally on each side to fuse with flattened and plate-like ventral margin (Fig. 23; V.m.). Fine setae found along margins of dorso-lateral border.

Claspers. - T-shaped (Fig. 24) with a thick stem tapering basad. A number of fine scallopings found on inner surface of each arm of crosspiece and several small setae on each side of stem at its junction with cross arm.

Aedoeagus. - Theca conical very slightly sclerotized, bearing on the ventral margin centrally a long cylindrical membraneous process (Fig. 25; Th. pr.), apex slightly sclerotized, pointed. Three pairs of conjunctival appendages present. First (Fig. 25) membraneous basally, apically sclerotized forming a stout curved horn; second (Fig. 25) heavily sclerotized, horn-like; third, very small sclerotized horns.

Vesica. - Consisting of a long cylindrical tube (Fig. 25) apically membraneous, hook-shaped, upper margin of hook bearing a fringe of hairs. Vesica sclerotized basally and bearing on dorsal surface a pair of leaf-like vesical processes (Fig. 26; Ve. pr.). Seminal duct (Fig. 26) opening ventrally into an anterior sinus (Fig. 26) to which posteriorly is attached a small elongate and heavily sclerotized reservoir (Fig. 26). Endophallic duct (Fig. 26) originating from anterior sinus and terminating in a wide membraneous secondary gonopore (Fig. 26) lying within invaginated apex of vesica.

Pachycorini

Camirus moestus (Stål), 1862

(Figs. 27- 31)

Pygophore. - Dorsal border evenly arched (Fig. 27) laterally with two rounded prominences,

ventral border almost straight.

Claspers. - Simple hook-like (Fig. 28) shallow, stem fairly long.

Aedoeagus. - Theca squat,cylindrical, not heavily sclerotized. Two pairs of conjunctival appendages: first (Fig. 29) entirely membraneous, bag-like, apically rounded; second conjunctival appendages (Fig. 29) bifid, ventral arm short, flat, sclerotized and disc-like; dorsal arm membraneous, cylindrical, tapering apically to a blunt point; both arms borneon a common partially sclerotized stem.

Vesica. - Complex (Fig. 30); endophallic duct apically (Fig. 30) surrounded by a large oblong membraneous sheath covered with very fine spines. Seminal duct (Fig. 30) very fine,passing ventrally into base of ejaculatory duct. A wide thickened convoluted duct (Fig. 30; C.du.) extending back from entrance of seminal duct, widening posteriorly into a large sinus (Fig. 30; Si.); latter communicating by means of a valve-like arrangement (Fig. 30; Va.) with a large dorsal ejaculatory reservoir (Fig. 30). A long funnel-like duct connecting ejaculatory reservoir with a narrow ventral chamber (Fig. 30; V.ch.) latter leading anteriorly into a short endophallic duct (Fig. 30).

Note. - This type of vesica resembles that found in the Scutellerini (McDonald, 1961) particularly in possessing a long convoluted duct.

Pachychoris torridus (Scopoli), 1772
(Figs. 32 - 36)

Pygophore. - Dorsal margin membraneous, bearing medianly a narrow,heavily sclerotized band produced into a broad median process (Fig. 32; M.pr.), apically acute (Fig. 33). A pair of cylindrical pygophoral appendages (Fig. 32; Py.ap.) lying one on either side of median process; each appendage apically with two spines, outermost spine being single, innermost bifid. Lateral margins of pygophore somewhat flattened; ventral border flattened and shelf-like (Fig. 32).

Claspers. - Small (Fig. 34); stem short, stout merging into a broad flattened hook; a number of fine setae found at base of hook.

Aedoeagus. - Theca cone-shaped (Fig. 35). Two pairs of conjunctival appendages: first,large completely sclerotized,horn-like structures fused to margin of theca; second conjunctival appendages (Fig. 35) cylindrical, rod--like, apically smoothly rounded bearing half way along ventral margin a stout spine (Fig. 35; Sp.), below which is a deep notch.

Vesica. - Extremely small and simple in construction (Fig. 36); lying between bases of second conjunctival appendages; apically opening into a longitudinal groove. Seminal duct (Fig. 36) opening

into a small tube expanded medianly into an anterior sinus (Fig. 36; A.s.), narrowing distally into a very short endophallic duct (Fig. 36).

Note. - The vesica is unusual in not possessing a free apical portion as in other Scutellerinae.

<u>Chelysomidea</u> <u>guttata</u> (Herrich-Schaeffer), 1839.

(Figs. 37 - 40)

Pygophore. - Dorsal border (Fig. 37) arcuate; practically obsolete medianly, laterally produced on each side into two stout sclerotized points (Fig. 37; Pr.). Ventral margin flattened, border almost straight. Proctiger (Fig. 37) very distinct, membraneous except for a narrow dorsal median sclerite apically produced into a short curved median spine (Fig. 37; sp.), lateral margins produced into a long spine; anal opening lying between this triad of spines. A narrow band of very fine spicules on lateral margins on each side from base of lateral spine.

Claspers. - Scythe-shaped (Fig. 38), stem broad, a number of very small teeth found along inner margin of hook.

Aedoeagus. - Theca membraneous, hardly differentiated from conjunctiva (Fig. 39). Two pairs of conjunctival appendages: first

(Fig. 39) stout, L-shaped horns, heavily sclerotized; second conjunctival appendages (Fig. 39) long, heavily sclerotized, apically flattened, and blade-like.

Vesica. - Simply constructed, seminal duct (Fig. 40) opening ventrally into a wide sclerotized tube, posteriorly dilated forming ejaculatory reservoir (Fig. 40); anteriorly extending forwards as a wide endophallic duct, latter apically membraneous (Fig. 40).

<u>Homaemus</u> <u>aeneifrons</u> (Say), 1824
(Figs. 41 - 46)

Pygophore. - Opening roughly hexagonal (Fig. 41), dorsal margin broad bearing a number of fine setae laterally dorsal margin bears a small pointed projection one on each side. Ventral margin flattened somewhat medianly.

Claspers. - Hook-shaped (Fig. 42) with a stout stem, a number of long setae at base of hook.

Aedoeagus. - Theca small, conical (Fig. 43). Three pairs of conjunctival appendages: first (Fig. 44) basally voluminous membraneous structures, apically bearing a heavily sclerotized horn; second conjunctival appendages small, elongate, membraneous structures;

third conjunctival appendages broad and flattened, moderately sclerotized and with numerous small teeth scattered over outer surface (Fig. 45).

Vesica. - Base of vesica resembling a nautilus shell (Fig. 46), coiled and with a number of pseudo-partitions; central portion of coil attached on either side to common base of conjunctival appendages. Apex of vesica broadly rounded, armed with a large number of small spines (Fig. 46). Seminal duct (Fig. 46) extending ventrally into apical half of vesica and into a wide endophallic duct (Fig. 46), latter bent through 90°, apically membraneous and opening into a membraneous pouch (Fig. 46; Gp.) on mid dorsal surface of vesica. Ejaculatory reservoir (Fig. 46) small and continuous with endophallic duct.

Note. - The coiled structure at the base of the vesica is possibly a structure to enable fluids to be pumped into the appendages thereby expanding them.

Tetyra antillarum (Kirkaldy), 1909

(Figs. 47 - 51)

Pygophore. - Dorsal border acutely arched (Fig. 47), laterally bearing two smooth sausage-shaped callouses one on each side (Fig. 47; Cal.) lying just above apex of claspers. Ventral border sinuous bearing a rounded ridge on ventral surface. Lateral margins with numerous short setae; ventral border with long fine setae.

Claspers. - Hook-shaped (Fig. 48), bifid at apex,outer tooth acute, inner tooth blunt,both heavily sclerotized. Stem short,squat,bearing a number of long setae on a slight promontory at junction with hook.

Aedoeagus. - Theca small, cone-shaped (Fig. 49). Two fairly large conjunctival appendages present: first conjunctival appendages (Fig. 50) fused basally for about half their length, apically bearing a small heavily sclerotized point; second conjunctival appendages (Fig. 50) also basally fused, apical two-thirds free and capped with a long heavily sclerotized horn.

Vesica. - Long and narrow, heavily sclerotized; dorsal margin bearing a triangular sclerotized projection (Fig. 51). Seminal duct merging ventrally into a wide S-shaped endophallic duct (Fig. 51); ejaculatory reservoir (Fig. 51), small crescent-shaped, opening into base of

endophallic duct.

Sphyrocoris obliquus (Germar), 1839
(Figs. 52 - 56)

Pygophore. - Opening surrounded by a wide flange dorsally and laterally (Fig. 52): ventral margin flattened forming a lip with a slight median indentation. Fine setae found on lateral margins and along ventral border.

Claspers. - Scythe-shaped (Fig. 53), stem short and stout; base of hook bearing a number of large stout setae. Inner surface of hook scalloped.

Aedoeagus. - Theca small, cup-shaped (Fig. 54). Two conjunctival appendages: first membraneous (Fig. 54) broadly rounded at apex and fused to margin of theca; second conjunctival appendages (Fig. 54) basally membraneous, apically bearing a small heavily sclerotized horn.

Vesica. - Divided into two parts (Fig. 55), ventral portion widely V-shaped, apex blunt bearing a large number of barbs (Fig. 55; Ve.). Dorsally and in apposition is a wide supra-vesical process (Fig. 55; S.ve.pr.) marked with a number of striae, upper margin with a groove and bearing a number of small sharp teeth; this process fused to base of vesica.

Endophallic duct (Fig. 56) opening into a small anterior sinus (Fig. 56) at the base of the ejaculatory duct, latter fairly straight, situated along ventral arm of vesica opening at its apex. Ejaculatory reservoir (Fig. 56) pear-shaped, lying above and directly connected to anterior sinus.

<u>Stethaulax</u> <u>marmoratus</u> (Say), 1831

(Figs. 57 - 62)

Pygophore. - Dorsal border (Fig. 57) diffuse with a small notch just above base of clasper one on each side, ventral margin flattened.

Claspers. - Small club-like structures (Fig. 58) apically produced into a small beak-like point, a number of long setae found laterally and beneath the apex on the stem, apex minutely scalloped on both sides.

Aedoeagus. - Theca small, cup-shaped (Fig. 59) with a shallow median groove on the ventral margin, lateral surfaces with a number of very minute spines scattered in a band just below the margin. Two conjunctival appendages: first (Fig. 59) long, cylindrical, basally membraneous, apically with a heavily sclerotized bluntly rounded tip; second conjunctival appendages (Fig. 59) basally membraneous, broad, apically produced into a long heavily sclerotized horn.

Vesica. - Apex broad (Fig. 60), flattened in a dorso-ventral plane. Seminal duct (Fig. 61) opening ventrally into a small sinus (Fig. 61), lying above and connected to latter is a small elongate dorsal reservoir (Fig. 61; D.r.). Extending back from atrium is a wide duct (Figs.61, 62) becoming convoluted and thickened, posteriorly widening into dorsal chamber of ejaculatory reservoir (Fig. 61; D.ch.), lying beneath is a ventral chamber (Fig. 61) connected to upper chamber by a narrow passage. Endophallic duct L-shaped (Fig. 61) originating from entrance of seminal duct.

<u>Symphylus</u> <u>carribeanus</u> (Kirkaldy), 1909
(Figs. 63 - 67)

Pygophore. - Dorsal margin broad (Fig. 63) extending laterally and merging into flattened ventral margin. Ventral and lateral margins with numerous long fine setae, proctiger distally also covered with fine setae.

Claspers. - heavily sclerotized (Fig. 64) hammer-shaped, stem centrally swollen, fused at right angles to cross arm one side of which is longer than the other; longer arm bearing two small teeth apically one on upper margin and one on lower; short arm bearing one tooth on lower margin. Lateral surfaces of head finely scalloped, a number of stout setae on stem below junction with head.

Aedoeagus. - Theca small, globose (Fig. 65). Two pairs of conjunctival appendages: first blade-like (Fig. 65) moderately sclerotized apically acute; second (Fig. 65) very long cylindrical membraneous, apically bearing a heavily sclerotized horn. Median penal lobes present (Fig. 65; Me.p.), dorsally fused together around base of vesica, apically free forming two broad flat plates (Fig. 66) on either side of apex of ejaculatory duct; ventral margin with a number of peg-like teeth (Fig. 65).

Vesica. - Seminal duct (Fig. 67) opening ventrally into a small bilobed anterior sinus (Fig. 67); from latter a wide duct opening into dorsal chamber (Fig. 67; Du.) of ejaculatory reservoir. Dorsal chamber connected to a large ventral chamber (Fig. 67) by means of a narrow passage. Endophallic duct (Fig. 67) extending from anterior sinus, short and straight, apically terminating a short distance beyond the margins of the median penal lobes.

<u>Diolcus</u> <u>irroratus</u> (Fabricius), 1775

(Figs. 68 - 72)

Pygophore. - Dorsal border U-shaped (Fig. 68) laterally with two C-shaped indentations lying adjacent to apices of claspers on each side. Ventral border narrow flattened slightly sinuate.

Fine setae found on lateral and ventral margins.

Claspers. - Stem stout (Fig. 69), apically produced into a short blunt hook. Inner margin of hook scalloped. A few stout setae at base of hook and along outer lateral margin of stem: numerous very small fine spines along the inner lateral margin.

Aedoeagus. - Theca small, conical, (Fig. 70) dorsal surface greatly enlarged and produced into two large flat horns (Fig. 70; Th.pr.) one on each side with a wide U-shaped emargination between them. One pair of cylindrical conjunctival appendages (Fig. 70), membraneous apically bearing a heavily sclerotized gently curved horn.

Vesica. - Situated in a large oblong membraneous conjunctiva, (Fig. 71) long narrow and sclerotized, seminal duct (Fig. 72) passing straight into ejaculatory duct (Fig. 72); no ejaculatory reservoir. A small ventrally projecting apodeme (Fig. 72; Ap.) attached at junction of endophallic duct and seminal duct. A deep sclerotized pit (Fig. 72; Pi.) borne dorsally within conjunctiva; beneath this pit and immediately above basal half of vesica is a band of muscle fibres (Fig. 72; Mu.).

Note. - The latter structure is probably some type of pumping device, though this is purely conjectural at this stage.

Acantholomidea porosa (Germar), 1839

(Figs. 73 - 78)

Pygophore. - Somewhat oblong in outline (Fig. 73), opening surrounded on dorsal and lateral margins by a fairly wide flange, ventral margin narrow centrally. Proctiger (Fig. 73) heavily sclerotized antero-dorsally extended into a V-shaped process lying on top of ventral margin of pygophore. A number of minute setae on ventral margin and a number of stout setae on posterior margin of proctiger.

Claspers. - Stem long (Fig. 74) apically with a shallow hook, a few stout setae situated at base of hook.

Aedoeagus. - Theca small squat (Fig. 75) broader than long. Three pairs of conjunctival appendages: first (Fig. 76) large horn-like structures sclerotized almost to base which is membraneous; second conjunctival appendages (Fig. 76) smaller, membraneous squat structures, bearing apically a pair of stout heavily sclerotized curved spines; third conjunctival appendages (Fig. 76) narrow cylindrical, sclerotized structures, apically acute.

Vesica. - Seminal duct (Fig. 78) entering into a wide endophallic duct (Fig. 78) latter

extremely short, not extending past margin of ejaculatory reservoir. From endophallic duct posteriorly is a wide duct opening into an S-shaped ejaculatory reservoir (Fig. 78); latter divided by a septum into a large dorsal chamber (Fig. 78) and a smaller ventral chamber (Fig. 78).

Scutellerini

Augocoris *gomesii* (Burmeister), 1835
(Figs. 79 - 83)

Pygophore. - Dorsal border (Fig. 79) smoothly rounded; ventral border with two deep V-shaped emarginations on either side of a stout blunt median process, lateral margins produced into blunt points. Dorsal and ventral margins covered with long fine setae.

Claspers. - Hook-shaped (Fig. 80) with long curved stem; apex with a small tooth; base of hook with a number of setae.

Aedoeagus. - Theca heavily sclerotized, cylindrical with two small protub erances on antero-dorsal margin (Fig. 81) one on each side of mid-line. Two pairs of conjunctival appendages present: first (Fig. 82) bifid, one branch completely membraneous cylindrical blunt at apex; the other sclerotized, broadly rounded at apex; common

base membraneous; sclerotized band (Fig. 82) found round base of first conjunctival appendages, probably representing remains of second; third conjunctival appendages (Fig. 82) typically scutellerine, heavily sclerotized cylindrical and apically acute.

Vesica. - Seminal duct (Fig. 83) connected directly into base of endophallic duct; a long convoluted duct (Fig. 83) leading back from entrance of seminal duct, expanding dorsally into an elongate ejaculatory reservoir (Fig. 83), latter connected by a canal to a large dorsal sinus (Fig. 83); a short stout endophallic duct attached apically to sinus (Fig. 83).

Note. - Kumar (1964) states that the seminal duct passes directly into the convoluted duct (conducting canal 1), and that the latter in most species of the subtribe Scutelleraria was in reality a double duct. This was not found to be true in this case and has been discussed in the introduction to this section.

PENTATOMINAE

Pentatomini

<u>Pentatoma</u> <u>rufipes</u> (Linnaeus), 1758

(Figs. 84 - 89)

Described and figured by Piotrowski (1950). However, because his description is in Polish a second description in English is not out of

place.

Pygophore. - Dorsal border (Fig. 84) broadly arched medianly with a small bilobed superior ridge. Ventral border deeply concave (Fig. 85) centrally with a narrow U-shaped inferior ridge, internally forming two ridges (superior rests of Leston, 1954).

Claspers. - C-shaped (Fig. 86) and strap-like; divided into two arms, upper arm (Fig. 86; U. a.) apically divided into a proximal broadly rounded lobe and a distal elongate process, lower arm (Fig. 86; L. a.) fused to margin of pygophore apically heavily sclerotized and produced into a broad flattened flange.

Aedoeagus. - Theca long cylindrical (Fig. 87). One pair of conjunctival appendages; (Fig. 87) cylindrical very lightly sclerotized; apically produced into two blunt lobes. Median penal lobes (Fig. 88) fused to form a cone around apex of vesica with lateral margins somewhat thickened and produced into blunt points dorsally.

Vesica. - Seminal duct (Fig. 89) mergining apically into a canal (Fig. 89) found along ventral and dorsal margins of box-like ejaculatory reservoir (Fig. 89); anteriorly reservoir with an oval anterior

chamber (Fig. 89) separated from reservoir by an incomplete septum; canal opening into this chamber dorsally. Base of endophallic duct (Fig. 89) inserted into reservoir ventrally; duct short, slightly kinked, apically terminating between median penal lobes.

<u>Dendrocoris</u> <u>humeralis</u> (Uhler), 1877

(Figs. 90 - 95)

Pygophore. - Dorsal border (Fig. 90) with a narrow superior ridge; lying one on either side are a pair of oblong genital plates (Fig. 91; G.pl.) upper surfaces finely scalloped. Ventral border (Fig. 90) produced into two large triangular platforms one on each side with a deep median trough between them, outer margin of trough with a deep median U-shaped emargination (Fig. 92).

Claspers. - Flattened, (Fig. 93) broad, apex emarginate heavily sclerotized, dorsal margin apically terminating in a point, ventro-apical margin broadly rounded. Clasper somewhat C-shaped in outline inner apical margin finely scalloped.

Aedoeagus. - Theca elongate cylindrical. One pair of conjunctival appendages (Fig. 94), membraneous baggy structures, apically broadly

rounded (not fully inflated in diagram), an elongate cylindrical dorsal conjunctival lobe (Fig. 94; D.C.lo.) present and a second broadly rounded balloon-like lobe found ventrally (Fig. 95; V.c.lo.), enclosed by conjunctival appendages, probably representing greatly modified median penal lobes.

Vesica. - Ejaculatory reservoir large divided by means of septae into a series of ducts. Seminal duct (Fig. 95) merging ventrally into a long canal (Fig. 95; Ca.) leading round base of reservoir to apico-dorsal region and into a duct (Fig. 95) which in turn opens into a central sinus (Fig. 95; Ce.s.). Base of endophallic duct continuous with central sinus (Fig. 95), duct wide, U-shaped bearing a small flange ventro-basally (Fig. 95).

<u>Piezodorus</u> <u>lituratus</u> (Fabricius), 1794

(Figs. 96 - 100)

Claspers, aedoeagus and vesica figured by Pruthi (1925).

Pygophore. - Dorsal border (Fig. 96) widely U-shaped opening of pygophore small. Ventral border with a shallow median emargination, gently sloping dorsad on either side. Ventral surface beneath border almost vertical with two shallow median depressions. A number of stout setae found

along margins.

Claspers. - Stem fairly broad (Fig. 97) apically bent at right angles forming a short triangular head, outer lateral margin finely scalloped.

Aedoeagus. - Theca small, oval in outline. Two pairs of conjunctival appendages: first (Fig. 98) membraneous, cylindrical, apically tapering slightly to a sclerotized blunt apex, basally produced into four conjunctival lobes; second conjunctival appendages (Fig. 98) basally membraneous, cylindrical, apically bearing a heavily sclerotized horn. Median penal lobes (Fig. 99) flattened and leaf-like, fused along their dorsal margins, and to the sub-apical portion of the vesica.

Vesica. - Ejaculatory reservoir (Fig. 100) divided into two chambers by means of a stout sclerotized septum. Seminal duct (Fig. 100) merging ventrally into a narrow canal (Fig. 100) passing round posterior margin of ejaculatory reservoir to open into anterior chamber. Endophallic duct (Fig. 100) opening out from posterior chamber of ejaculatory reservoir, moderately long and sinuous, apically terminating between median penal lobes.

<u>Solubea pugnax</u> (Fabricius), 1775

(Figs. 101 - 105)

Pygophore (Fig. 101) and claspers (Fig. 102) described by Sailer (1944).

Aedoeagus. - Theca cylindrical with a short membraneous hinge attaching it to basal plates (Fig. 103; B.p.). One pair of conjunctival appendages (Fig. 103) small, moderately sclerotized throughout, apically broadly rounded. Median penal lobes (Fig. 103) forming a cylindrical sheath round apex of vesica (Fig. 104), apical lateral margins heavily sclerotized forming a flat plate ventrally on each side, dorsally lobes fused together by means of a membrane.

Vesica. - Seminal duct (Fig. 105) enclosed in a thick membraneous sheath, opening ventrally into base of endophallic duct (Fig. 105); latter moderately long enclosed in a stout cylindrical sheath, apically bent through 90°, basally widening into a small bulb-like ejaculatory reservoir (Fig. 105).

Peribalus limbolarius (Mulsant and Rey), 1866

(Figs. 106 - 110)

Pygophore (Fig. 106) and claspers (Fig. 107) described by Baker (1931).

Aedoeagus. - Theca vasiform expanded anteriorly into a large thecal shield (Fig. 108; Th.s.); two pairs of processes found on lateral sides of theca (Fig. 108) two on each side; anterior processes (Fig. 108; A.th.pr.) large, lightly sclerotized, cylindrical, broadly rounded apically; posterior processes (Fig. 108; P.th.pr.) smaller, heavily sclerotized, broadly rounded. One pair of membraneous conjunctival appendages (Fig. 108) divided into two broad lobes. Median penal lobes (Fig. 109) flattened laterally into two wide sclerotized plates, ventro-apical margins finely serrate basally united by a narrow cross-bar one third distance from their bases, lobes not enclosing apex of vesica.

Vesica. - Ejaculatory reservoir (Fig. 110) somewhat oblong with a canal (Fig. 110) round posterior surface into which seminal duct (Fig. 110) enters ventrally. Endophallic duct (Fig. 110) narrow sinuous, basally opening into apex of reservoir.

Trichopepla semivittata (Say), 1832

(Figs. 111 - 114)

Pygophore. - Dorsal border (Fig. 111) deeply and evenly arched, laterally bearing a small protuberance, one on each side; ventral border (Fig. 112) widely U-shaped. Two flat leaf-like genital plates one on either side lying beneath the protuberance on the dorsal border.

Claspers. - C-shaped, bifid at apex (Fig. 113), no differentiation between stem and apex; five fine setae on inner margin.

Aedoeagus. - Theca lightly sclerotized, cylindrical and tapering apically. One pair of conjunctival appendages (Fig. 114) membraneous except for a line of sclerotization along ventral margin, apically broadly rounded. Median penal lobes absent.

Vesica. - Seminal duct (Fig. 114) ventrally opening into a simple globular ejaculatory reservoir (Fig. 114). Endophallic duct (Fig. 114) heavily sclerotized, attached to reservoir dorsally, duct long, thin and sinuous, apically a fine needle-like point.

Mormidea lugens (Fabricius), 1775

(Figs. 115 - 118)

Pygophore. - Opening small (Fig. 115) surrounded by wide margins, dorsal border deeply arched; ventral border medianly U-shaped with two acute prominences one on either side of emargination.

Claspers. - Very small (Fig. 116) stout oblong structures, apically very broadly rounded.

Aedoeagus. - Theca small squat (Fig. 117). One pair of membraneous balloon-like conjunctival appendages (Fig. 117). A large sheath-like structure (Fig. 117) present, probably fused median penal lobes; moderately sclerotized, ventrally with a deep cleft, basally narrowed and forming a short cylindrical stem; whole structure surrounding apex of vesica.

Vesica. - Endophallic duct (Fig. 118) moderately long bearing two sclerotized flanges, medianly wide, rounded, apically tapering, basally endophallic duct expanding into a small bulb-like ejaculatory reservoir (Fig. 118). Seminal duct (Fig. 118) connecting with base of ejaculatory duct ventrally.

Brepholoxa heidmanni (Van Duzee), 1904

(Figs. 119 - 123)

Pygophore. - Opening of pygophore dorsad (Fig. 119) and somewhat triangular. Dorsal border shallowly concave with a narrow superior ridge not clearly differentiated from border proper. Ventral border with two elongate callouses forming a V; a deep U-shaped notch formed between apices of callouses. Two further notches found, one on either side between junction of dorsal and ventral borders.

Claspers. - Stem short, stout, C-shaped (Figs. 120, 121), bearing apically a small heavily sclerotized triangular pad, finely scalloped, a second triangular pad found below apical one also finely scalloped.

Aedoeagus. - Theca small, cylindrical. One pair of conjunctival appendages (Fig. 122) divided into three broad membraneous lobes, ventralmost fused together forming a platform beneath apex of vesica; dorsal lobes largest, somewhat leaf-like (Fig. 122).

Vesica. - Ejaculatory reservoir (Fig. 123) membraneous, oval, with a pair of septa attached to dorsal surface, reaching mid way into

reservoir forming an upper chamber. A canal (Fig. 123) leads from apico-ventral surface round posterior margin of reservoir to open apically into an upper chamber. Seminal duct (Fig. 123) inserted directly into this canal. Endophallic duct (Fig. 123) originating from apex of lower chamber of reservoir, short and curved through 90°.

<u>Arvelius</u> <u>albopunctatus</u> (DeGeer), 1773
(Figs. 124 - 128)

Pygophore. - Dorsal border deeply concave (Fig. 124) with two rounded projections laterally, (Fig. 125) one on each side; ventral border also deeply concave, margin flattened into a lip bearing two longitudinal ridges (Fig. 124; Ri.).

Claspers. - F-shaped, distal arm apically bluntly bilobed (Fig. 126).

Aedoeagus. - Theca typically cylindrical with two small sharply pointed processes on dorsal margin (Fig. 127). Conjunctival appendages (Fig. 127) composed of three membraneous rounded lobes fused onto a common base and a dorsal median conjunctival lobe (Fig. 127). Median penal lobes (Fig. 127) consisting of a flat pair of plates apically truncate, lobes fused along their lower margins forming a trough around apex of vesica.

Vesica. - Seminal duct (Fig. 128) opening medianly into a wide canal (Fig. 128) round base of ejaculatory reservoir and connected to a dorso-apical chamber (Fig. 128); ejaculatory reservoir oval (Fig. 128) incompletely divided by means of a stout septum (Fig. 128) into two chambers. Endophallic duct (Fig. 128) S-shaped basally originating from apico-ventral half of ejaculatory reservoir.

<u>Aelia</u> <u>americana</u> (Dallas), 1851
(Figs. 129 - 133)

Pygophore (Fig. 129) and Claspers (Fig. 130) described by Baker (1931).

Aedoeagus. - Theca cylindrical (Fig. 131) somewhat diamond-shaped in dorso-ventral plane due to two lateral conical projections, one on each side; dorsal margin produced into a thecal shield (Fig. 131). One pair of conjunctival appendages (Fig. 131), broad, membraneous lobes rounded apically; when fully inflated balloon-like. A large membraneous conjunctival lobe (Fig. 131) present. Median penal lobes (Fig. 132) small, thin, heavily sclerotized, basally fused to a wide common base.

Vesica. - Seminal duct (Fig. 133) inserted directly into a long canal (Fig. 133) which opens by means of a valve-like arrangement into dorso-apical region of ejaculatory reservoir (Fig. 133), latter lying centrally, apically merging into a sinuous endophallic duct (Fig. 133) with spout-like apex.

Vulsirea violacea (Fabricius), 1803
(Figs. 134 - 138)

Pygophore. - Dorsal margin (Fig. 134) bearing two oval patches of short heavily sclerotized setae one on either side, probably similar to patches of similar setae found in Scutellerinae (McDonald, 1961), however in this species setae not arranged in rows. Ventral margin gently concave bearing laterally on each side a stout finger-like process (Fig. 134), further behind these are a pair of stout bifid processes (Fig. 134) one on each side; a narrow ridged floor with a deep median V-shaped cleft running between these inner pygophoral processes.

Claspers. - Stem short (Fig. 135) apically produced into three lobes, middle lobe longer than two outer lobes. Outer surfaces of lobes finely scalloped.

Aedoeagus. - Theca small somewhat oblong (Fig. 136). Two pairs of conjunctival appendages basally fused: first (Fig. 136) membraneous, basally wide, apically produced into a narrow sclerotized point; second conjunctival appendages (Fig. 136) membraneous, cylindrical, apically blunt. Median penal lobes (Fig. 137) disc-like, medianly fused to one another and sub-apex of vesica, basally each lobe produced into a bifid process.

Vesica. - Ejaculatory reservoir large (Fig. 138) with a partial septum dividing it into two chambers. Seminal duct (Fig. 138) inserted into base of endophallic duct, from this point is a long duct slightly convoluted posteriorly (Fig. 138) opening into the apico-dorsal portion of ejaculatory reservoir. Endophallic duct wide (Fig. 138) and short, fused between median penal lobes.

<u>Acrosternum</u> <u>pennsylvanicum</u> (DeGeer), 1773

(Figs. 139 - 143)

Pygophore. - Dorsal border with a broad superior ridge (Fig. 139) medianly. Ventral border shallowly concave (Fig. 140), two flat processes found on margin one on either side, outer margin concave with a number of very small heavily

sclerotized teeth.

Claspers. - Simple (Fig. 141) spear-shaped with a very short stout stem.

Aedoeagus. - Theca small cylindrical. One pair of small membraneous conjunctival appendages (Fig. 142) attached to a large membraneous base. Median penal lobes (Fig. 142) tubular, sclerotized, with a small expanded head apically, basally fused to a common stem.

Vesica. - Seminal duct (Fig. 143) opening ventrally into a simple sac-like and membraneous ejaculatory reservoir (Fig. 143). Endophallic duct (Fig. 143) passing forward from apex of reservoir, slightly kinked, short, apically terminating between apices of median penal lobes.

<u>Chlorocoris</u> <u>subrugosus</u> (Stål), 1872
(Figs. 144 - 147)

Pygophore. - Dorsal border (Fig. 144) medianly evenly arched, laterally bearing two small projections one on each side; ventral border (Fig. 145) deeply concave, sinuate, medianly with a bilobed inferior ridge with a minute spine on either side laterally. Proctiger (Fig. 144) long, narrow, bearing apically two flat lobes covered with a mat of fine setae.

Claspers. - Apex formed into a trilobed umbrella-like structure (Fig. 146) stem short and slender, upper surface of apex covered with a dense matt of fine setae.

Aedoeagus. - Theca large cylindrical with very large basal plates; apically produced into a short cylindrical thecal shield (Fig. 147) surrounding the sub-apical portion of the vesica. No conjunctival appendages or median penal lobes.

Vesica. - Seminal duct (Fig. 147) wide passing medianly into a canal (Fig. 147), latter found round posterior end of ejaculatory reservoir and opening dorsally. Ejaculatory reservoir (Fig. 147) simple sac-like, endophallic duct (Fig. 147) originating from posterior end of reservoir as a wide duct, narrowing anteriorly, short, slightly curved, apically terminating a short distance beyond thecal shield.

<u>Carpocoris</u> <u>remotus</u> (Horvath), 1907
(Figs. 148 - 154)

Pygophore. - Opening wide, triangular (Fig. 148); dorsal border widely arched bearing two large cone-shaped lateral projections one on either side of mid line; lying beneath these one on each side, a thin saucer-like genital plate (Fig. 149),

very lightly sclerotized with a fringed margin and numerous small spines on upper surface. Ventral border (Fig. 150) with a small median V-shaped emargination and two rounded prominences one on either side of median emargination.

Claspers. - Stem short stout (Fig. 151) produced into a flattened oblong leaf-like apex bearing a sharp tooth on lower angle, dorsal surface deeply cleft.

Aedoeagus. - Theca small, squat (Fig. 152), with two small projections one each side, on the apical margin in a dorso-lateral position. One pair of membraneous conjunctival appendages (Figs. 152, 153) leaf-like, with a sharp sclerotized ridge along ventral margin.

Vesica. - Ejaculatory reservoir (Fig. 154) sac-like with posterior canal (Fig. 154) into which seminal duct (Fig. 154) opens ventrally. Endophallic duct (Fig. 154) long S-shaped, basally entering apex of reservoir, apex spout-like.

<u>Nezara</u> <u>viridula</u> (Linnaeus), 1758

(Figs. 155 - 160)

Described and figured by Pruthi (1925).

Additional descriptions and corrections given below.

Pygophore. - Dorsal border concave with a very narrow superior ridge (Fig. 155); ventral border (Fig. 156) with a deep emargination.

Claspers. - Inner surface of clasper finely scalloped (Fig. 157).

Aedoeagus. - Theca moderately long, cylindrical. One pair of small membraneous conjunctival appendages (Fig. 158), very short, broad (apparently not noted by Pruthi). Median penal lobes (Fig. 159) semi-circular, fused together into a broad U along ventral margins, enclosing apex of vesica.

Vesica. - Described and figured by Kumar (1964). Seminal duct (Fig. 160) merging into a wide funnel-shaped canal (Fig. 160) (conducting canal of Kumar), canal narrowing and opening round posterior margin of ejaculatory reservoir dorsally. Ejaculatory reservoir (Fig. 160) oval; endophallic duct (Fig. 160) short and slightly sinuous, basally merging with apex of reservoir.

<u>Thyanta</u> <u>perditor</u> (Fabricius), 1794

(Figs. 161 - 165)

Pygophore. - Somewhat globular, pygophoral opening small facing caudad; dorsal margin with a very narrow superior ridge (Fig. 161). Ventral

border with a deep median V-shaped notch. Stout setae found on lateral margins.

Claspers. - C-shaped (Fig. 162), upper margin straight bearing a number of fine setae, basal margin broad, stout, forming stem.

Aedoeagus. - Theca balloon-like and acentric, two small knobs (Fig. 163; Kn.) one on each side found on dorsal surface near apex. One pair of conjunctival appendages (Fig. 163), dorsally produced into an oblong membraneous process, basally appendage wide, apically tapering into a sclerotized horn. Median penal lobes (Fig. 164) cylindrical and curved in a U on either side of apex of vesica, each with a pointed tooth apically, heavily sclerotized throughout.

Vesica. - Very similar in construction to _Chlorocoris_ _subrugosus_, ejaculatory reservoir (Fig. 165) very large, globular, endophallic duct narrow and short (Fig. 165).

Padaeus _viduus_ (Vollenhoven), 1868

(Figs. 166 - 172)

Pygophore. - Dorsal border with a narrow superior ridge (Fig. 166); ventral margin flattened, border with a median V-shaped notch, two ridges,

one on each side forming a wide V, run from outer angles of ventral margin to centre of pygophore.

Claspers. - Flattened (Fig. 167), basally wide, apically produced into a blunt point, a line of fine scalloping running from apex a short distance down inner surface.

Aedoeagus. - Theca oval in shape (Fig. 168) bearing on dorsal surface a pair of heavily sclerotized rod-like thecal processes (Figs. 169, 170). Two pairs of conjunctival appendages fused basally: first (Fig. 169) membraneous apically blunt; second (Fig. 169) basally membraneous, apically sclerotized and bluntly rounded. Median penal lobes (Fig. 170) fused into a horseshoe-like shield surrounding apex of vesica (Fig. 171).

Vesica. - Consisting internally of a complicated series of ducts. Seminal duct (Fig. 172) passing ventrally into a long canal (Fig. 172) opening into dorsal half of ejaculatory reservoir; latter divided into dorsal (Fig. 172) and ventral (Fig. 172) ducts. Endophallic duct (Fig. 172) short, basally widening and merging into ventral chamber.

<u>Proxys</u> <u>punctulatus</u> (Palisot de Beauvois), 1805

(Figs. 173 - 176)

Pygophore. - Dorsal border medianly with a well developed superior ridge (Fig. 173), laterally bearing a small oblong projection on each side. Ventral margin flattened, border with a wide median U-shaped emargination, on either side of which is an oblong callous (Fig. 174) bearing a number of setae; running back from each callous are a pair of well sclerotized ridges medianly forming between them a U-shaped trough.

Claspers. - Stem stout wide (Fig. 175) produced apically into a blunt cylindrical process, inner margin with a narrow band of scalloping. Five or six small stout setae found on margin of stem.

Aedoeagus and vesica. - Similar in most respects to <u>Padaeus</u> <u>viduus</u>. Second conjunctival appendages (Fig. 176) somewhat more sclerotized than in P. <u>viduus</u>.

Note. - The general similarity of the genitalia of this species to that of P. <u>viduus</u> would suggest that these generally are closely related and should possibly be amalgamated.

<u>Neottiglossa trilineata</u> (Kirby), 1837

(Figs. 177 - 180)

Pygophore. - Dorsal border (Fig. 177) evenly arched, laterally bearing on each side a rounded lobe with a fringe of hairs. Ventral border almost straight with a wide median emargination, ventral margin below border almost vertical.

Claspers. - Stem stout oblong (Fig. 178) apically produced on inner side into a flat plate and on outer side into a short blunt process.

Aedoeagus. - Theca short, stout, bearing laterally two large knobs (Fig. 179) one on either side; apex of theca produced dorsally into a thecal shield (Fig. 179) consisting of two pointed lobes with a wide U-shaped depression between them. One pair of conjunctival appendages (Fig. 179) membraneous, broadly rounded apically; dorsal to these is a large and voluminous conjunctival lobe (Fig. 179) (not fully expanded in specimen). Median penal lobes (Fig. 179) sclerotized cylindrical and curved inwards, fused basally along their ventral margins and connected to sub-apex of vesica by means of two thickened arms one on each side.

Vesica. - Seminal duct (Fig. 180) opening ventrally into a wide canal (Fig. 180) extending round base of reservoir and opening into a simple sac-like ejaculatory reservoir. Endophallic duct (Fig. 180) short, slightly sinuous, entering ejaculatory reservoir apically.

<u>Murgantia</u> <u>histrionica</u> (Hahn), 1834
(Figs. 181 - 185)

Pygophore. - Dorsal border (Fig. 181) deeply arched and somewhat omega shaped; ventral border sinuous with a wide median U-shaped concavity, two small processes borne one on either side of the ventral border on the lateral margins (Fig. 181). Proctiger box-like (Fig. 181) centrally concave and produced into two flattened median processes distally.

Claspers. - Flattened basally (Fig. 182) apically narrowing into a blunt curved rod, no differentiation between stem and apex.

Aedoeagus. - Theca oblong, bearing distally a large cylindrical thecal shield (Fig. 183). One pair of long cylindrical membraneous conjunctival appendages (Fig. 183) (not fully expanded in diagram), apically blunt and moderately sclerotized. Median

penal lobes (Fig. 183) hook-like, basally fused to a common stem dorso medianly, apices connected by a small plate bearing a conical cap (Fig. 184) fitting over apex of vesica.

Vesica. - Ejaculatory reservoir (Fig. 185) S-shaped, terminating in a closed chamber. Seminal duct (Fig. 185) opening ventrally into base of endophallic duct (Fig. 185), latter proximally connected to apical chamber of ejaculatory reservoir, distally narrowing into a slightly curved duct, apically attached to median penal lobes.

<u>Eysarcoris</u> <u>aeneus</u> (Scopoli), 1763
(Figs. 186 - 191)

Pygophore. - Dorsal border (Fig. 186) sinuous, ventral border with a deep median U-shaped emargination, on each side of which is a triangular flattened area bearing a number of setae. Proctiger (Fig. 186) apically with a median bilobed sclerotized process.

Claspers. - Divided into two sections (Figs. 187, 188), a broad flattened diamond shaped blade apically acute and a semi-circular platform attached to base of blade, a number of setae around margin; outer edge finely scalloped.

Aedoeagus. - Theca conical (Fig. 189), flattened laterally. Two pairs of conjunctival appendages: first (Fig. 190) membraneous elongate tube-like fused together basally, apically bluntly rounded; second conjunctival appendages (Fig. 189) bifid consisting of two heavily sclerotized flattened spatula-like appendages fused basally and tapering into a long pointed process.

Vesica. - Ejaculatory reservoir (Fig. 191) small globose with a canal (Fig. 191) round posterior margin into which seminal duct (Fig. 191) opens ventro-apically. Endophallic duct (Fig. 191) long, sinuous, connected basally to apex of ejaculatory reservoir.

Eysarcoris intergressus (Uhler), 1893
(Figs. 192 - 196)

Pygophore. - Dorsal border (Fig. 192) evenly arched bearing on either side of the mid-line a small triangular genital plate. Ventral border with an inferior ridge, centrally below the ventral border is a shallow depression.

Claspers. - Chisel-like (Fig. 193) bilobed apically, a number of stout setae on outer surface.

Aedoeagus. - Theca tubular (Fig. 194). One pair of conjunctival appendages (Fig. 195)

divided into two arms, a large ventral cylindrical membraneous appendage, apically tapering to a sclerotized point; at base of this large arm is a small dorsal cylindrical appendage, apically blunt. A pair of rounded slightly sclerotized ventral conjunctival lobes (Fig. 194) present, fused to common base of conjunctival appendages.

Vesica. - Very similar to *Cosmopepla bimaculata*, endophallic duct more loosely S-shaped (Fig. 196).

Note. - This species shows no similarity with the European species E. *aeneus* studied but shows very great similarity to *Cosmopepla* in possessing genital plates, chisel-like claspers and a very similar aedoeagus and vesica. It is suggested that *Eysarcoris* should be placed in *Cosmopepla*. The European species *Eysarcoris aeneus* possess no genital plates, very peculiar claspers and the shape of the conjunctival appendages is quite different; the vesica shows some similarity.

Cosmopepla bimaculata (Thomas), 1865
(Figs. 197 - 200)

Pygophore (Fig. 197) and claspers (Fig. 198) described by Baker (1931).

Aedoeagus. - Theca cylindrical somewhat

curved when viewed laterally, two small projections (Fig. 199) one on each side near base of theca. One pair of conjunctival appendages (Fig. 199) each divided into a large membraneous cylindrical lobe, apically tapering to a blunt sclerotized point, and a second small rounded sclerotized lobe, borne dorsally. A pair of small rounded conjunctival lobes (Fig. 199) ventral to conjunctival appendages may represent second conjunctival appendages. No median penal lobes.

Vesica. - Seminal duct (Fig. 200) opening ventrally into a narrow canal (Fig. 200) found round posterior end of reservoir, and terminating dorsally. Endophallic duct (Fig. 200) long, broadly S-shaped entering ejaculatory reservoir through a groove formed by two sclerotized ridges on apex of reservoir.

<u>Rhytidolomia</u> <u>senilis</u> (Say), 1831
(Figs. 201 - 205)

<u>Rhytidolomia</u> <u>viridicata</u> (Walker), 1867
(Figs. 206 - 209)

<u>Rhytidolomia</u> <u>saucia</u> (Say), 1831
(Figs. 210 - 214)

<u>Chlorochroa</u> <u>sayi</u> (Stål), 1872
(Fig. 219)

Chlorochroa ligata (Say), 1831
(Figs. 215, 216)

Chlorochroa uhleri (Stål), 1872
(Figs. 217, 218)

From a study of the male genitalia alone it is very clear that these species are all very closely related to one another and should all be included in the genus Rhytidolomia. This fact was suspected by Sailer (1954) who also found that three of the species of Chlorochroa broke down into a maze of intermediate populations. A thorough study is needed to elucidate the validity of species included within the genus Rhytidolomia.

Rhytidolomia senilis

Pygophore. - Dorsal border with a broad median superior ridge (Fig. 201; Su.r.) passing down on each side round the base of the proctiger. Ventral border gently concave with a trilobed inferior ridge (Fig. 201; In.r.). Ventral and dorsal margins covered with fine setae.

Claspers. - Basally with a stout stem (Fig. 202) apically produced into three blunt lobes. A number of fine setae on outer and inner apical surfaces.

Aedoeagus. - Theca cylindrical, flattened slightly laterally. One pair of membraneous conjunctival appendages (Fig. 203), basally broad, apically broadly bilobed, a long membraneous blunt dorsal lobe at the base of which is a ventral lobe with heavily sclerotized apical point. Median penal lobes (Fig. 204) club-like, basally fused along their dorsal margins.

Vesica. - Seminal duct (Fig. 205), opening ventrally into a heavily sclerotized canal (Fig. 205) latter widening posteriorly and opening mid-dorsally into an oval ejaculatory reservoir (Fig. 205). Endophallic duct (Fig. 205) short, almost straight, merging into apex of reservoir.

Rhytidolomia viridicata

Pygophore (Fig. 206) and claspers (Figs. 207, 208). - Very similar to R. _senilis_, lobes of clasper somewhat more rounded.

Aedoeagus and Vesica. - Similar to R. _senilis_, conjunctival appendages divided into two completely membraneous lobes, no sclerotized apical point present.

Rhytidolomia saucia

Pygophore (Fig. 211) and claspers (Fig. 212). - Similar to R. *senilis*, shape of lobes at apex of claspers differs slightly, outer lobe acute.

Aedoeagus (Fig. 213) and vesica. - Similar in most respects to R. *senilis*. However differences exist in the basal plates of the theca, useable at a specific level.

Chlorochroa ligata

Pygophore. - Dorsal border with superior ridge (Fig. 215), extending laterally on each side in an arc forming a small lateral projection. Ventral border sinuous with a shallow median emargination.

Claspers. - Apically trilobed (Fig. 216) very similar to C. *uhleri*, slight differences in shape exist, however.

Aedoeagus and vesica. - Similar to *Rhytidolomia senilis*.

Chlorochroa uhleri, C. *sayi*

Pygophore (Fig. 217), claspers (Figs. 218,219) and aedoeagus described by Baker (1931). The genitalia for both these species similar in all respects to one another. Aedoeagus and vesica

similar to *Rhytidolomia senilis*.

Banasa dimidiata (Say), 1831

(Figs. 220 - 223)

Pygophore. - Dorsal border with a wide superior ridge (Fig. 220) with a median emargination. Ventral border flattened bearing two double knobbed processes (Fig. 220) one on each side of a median square projection on the border. Proctiger and margins of pygophore covered with fine setae.

Claspers. - Flattened, leaf-like (Fig. 221) covered with fine setae.

Aedoeagus. - Theca oblong, compressed laterally. One pair of membraneous conjunctival appendages (Fig. 222), broadly rounded apically. Median penal lobes elongate (Fig. 222), spatulate, apically free, broadly rounded, medianly fused on the ventral surface, not enclosing apex of vesica.

Vesica. - Ejaculatory reservoir (Fig. 223) oval, simple; seminal duct (Fig. 223) opening into reservoir antero-ventrally; a canal (Fig. 223) extending from entrance of ductus seminis around posterior portion of reservoir to open antero-dorsally. Endophallic duct (Fig. 223) short, slightly curved basally connected to apex of ejaculatory reservoir, apex of duct enclosed in a broad sclerotized sheath.

Loxa flavicollis (Drury), 1773

(Figs. 224 - 229)

Pygophore. - Dorsal border (Fig. 224) evenly arched, ventral border deeply concave and flattened. An unusual pair of pygophoral appendages (Fig. 225; Py.ap.) borne medianly, one on each side at the base of dorsal margin; apex triangular in shape, with a broad concave surface, produced into a long arm basally truncate, apex with long stout setae.

Claspers. - Unusual (Fig. 226), stem short, apex broad bearing seven processes on outer margin, six blunt and oblong, apical process produced into an acute point. Fine setae found over surface. Clasper resembles a drilling bit when viewed apically.

Aedoeagus. - Theca (Fig. 227) small, acentric, with very large and well developed basal plates; basal half of theca oblong becoming constricted medianly and curving dorsad and produced into a semi-circular plate, latter bearing a large bowl-like structure (thecal shield) with crenulated margins (Fig. 228). From centre of thecal sheath a second sheath (Fig. 228) surrounds apex of vesica probably fused median penal lobes. No conjunctival appendages present.

Vesica. - Seminal duct (Fig. 229) inserted ventrally into a heavily sclerotized canal (Fig. 229), latter passing round base of ejaculatory reservoir and terminating apically in a small 180° turn capped by a large sclerotized apodeme (Fig. 229). Ejaculatory reservoir (Fig. 229) very small, endophallic duct (Fig. 229) basally continuous with reservoir.

Note. - *Loxa flavicollis* presents a most aberrant type of genitalia. It is quite unique amongst specimens examined in possessing the unusual median penal lobes, no conjunctival appendages and the peculiar sheath developed on the margin of the theca. The vesica is also extremely simple and possesses an unusual pumping mechanism. On the basis of these distinct peculiarities *Loxa* could be placed in a sub-tribe of its own, however this would probably be better left till further work has been done on other species of *Loxa*.

Menecles insertus (Say), 1831

(Figs. 230 - 236)

Pygophore (Figs. 230, 231) and claspers (Fig. 232) described by Baker (1931).

Aedoeagus. - Theca vasiform with a pair of finger-like thecal processes (Fig. 234; Th.pr.). Two conjunctival appendages present, both membraneous

and fused to a wide common base: first conjunctival appendages (Fig. 233) long thin cylindrical structures, apically blunt; second (Fig. 233) short, broad, bearing five small lobes. Median penal lobes (Fig. 235) flattened and fused together forming a deep narrow groove between lobes in which apex of vesica is situated.

Vesica. - Seminal duct (Fig. 236) connected ventrally to wide base of endophallic duct, latter merging posteriorly into a broad,very heavily sclerotized ejaculatory reservoir (Fig. 236) with heavy striae on its lateral margins. Endophallic duct (Fig. 236) anteriorly narrow, very long and coiled around itself in a series of loops on right side of theca.

<u>Coenus</u> <u>delius</u> (Say), 1831

(Figs. 237 - 240)

Pygophore (Fig. 237) and claspers (Fig. 238) described by Baker (1931).

Aedoeagus. - Figured and described by Baker (1931), his lateral penal lobes (= conjunctival appendages) were not fully expanded. Theca vasiform with an apical overhanging rim, a pair of elongate finger-like thecal processes (Fig. 239) on dorsal margin of theca (titilators of Baker).

One pair of conjunctival appendages (Fig. 239) entirely membraneous, apically tapering and divided into two small blunt processes, one shorter than the other. Median penal lobes (Fig. 240) fused into a semi-circular disc-like structure with a wide median groove, apex of vesica lying within this groove.

Vesica. - Seminal duct (Fig. 240) heavily sclerotized opening into a small ventral sinus (Fig. 240); latter merges posteriorly into a heavily sclerotized oblong ejaculatory reservoir, lateral margins scored with a number of striae running in a ventro-dorsal direction. Endophallic duct (Fig. 240) basally united to anterior sinus, as a fairly wide duct, then narrowing and looping to right hand side of theca, passing through a wide circle to terminate within apex of median penal lobes.

<u>Hymenarcys</u> <u>nervosa</u> (Say), 1832
(Figs. 241 - 245)

Pygophore (Fig. 241) and claspers (Fig. 242) described by Baker (1931).

Aedoeagus. - Theca oblong bearing dorsally a pair of long cylindrical thecal processes (Fig. 244). One pair of membraneous conjunctival appendages (Fig. 243) very broad and voluminous

apically terminating in a short blunt point. Median penal lobes (Fig. 244) fused into a semi-circular flange bearing a deep median groove.

Vesica. - Seminal duct (Fig. 245) heavily sclerotized, connecting ventrally into wide base of ejaculatory duct which posteriorly communicates with dorsal ejaculatory reservoir (Fig. 245). Latter flattened dorso-ventrally, trilobed dorsally and heavily sclerotized, lateral margins with a number of well marked striae. Anteriorly endophallic duct (Fig. 245) narrows, twists sharply twice passing to right side of theca, then looping in a large circle terminates within groove between median penal lobes.

<u>Euschistus</u> <u>tristigmus</u> (Say), 1831

(Figs. 246 - 250)

Pygophore (Fig. 246) and claspers (Fig. 247) described by Baker (1931). Lower apical margin of clasper finely striated.

Aedoeagus. - Described by Baker (1931).

Theca oblong, with two rounded processes (Fig. 249) (titillators, Baker, 1931) dorsally, one on each side of the median line. Two pairs of conjunctival appendages (lateral penal lobes of Baker) fused onto a common membraneous base:

first (Fig. 248) membraneous, wide basally, apically acute slightly sclerotized; second conjunctival appendages (Fig. 248) small, apically acute slightly sclerotized, possibly only one bifid appendage represented since these appendages are not sharply divided from one another. Median penal lobes (Fig. 249) present, fused into a flat semi-circular plate with a median dorsal groove.

Vesica. - Seminal duct (Fig. 250) stout, opening ventrally into ejaculatory reservoir (Fig. 250) where it is bent through 180°, passing along proximal end of reservoir to open into a dorsal chamber (Fig. 250), latter connecting with a narrow ventral chamber (Fig. 250) by means of a longitudinal slit-like aperture in septum between dorsal and ventral chambers. Endophallic duct (Fig. 250) extremely long arising from middle of ventral chamber in ejaculatory reservoir, extending forwards as a wide tube, bending through 90° and becoming enclosed by bases of median penal lobes for a short distance; then turning through 90° to pass a short distance ventrally and loop round to right hand side of theca, from here looping in an S to finally pass in a wide circle terminating apically on dorsal groove formed by median penal lobes.

Prionosoma podopioides (Uhler), 1863

(Figs. 251 - 256)

Pygophore. - Dorsal border (Fig. 251) rounded with a broad superior ridge (Fig. 251 Su.r.) medianly extending down on each side of base of proctiger. Ventral border laterally diffuse, medianly with a U-shaped groove on either side of which is a slightly raised and rounded platform. A number of long fine setae found along dorsal and ventral margins.

Claspers. - Stout hook shaped (Fig. 252) stem wide, a number of fine setae on inner margin of hook.

Aedoeagus. - Theca small oblong, dorsal margin with two long cylindrical thecal processes (Fig. 254). One pair of conjunctival appendages (Fig. 253), basally wide membraneous, apically divided into two blunt lobes, ventralmost one apically sclerotized. Median penal lobes (Fig. 254) narrow semi-circular plates fused medianly forming a groove in which apex of vesica rests.

Vesica. - Seminal duct (Fig. 256) opening ventrally into a sclerotized canal (Fig. 256) found around proximal end of ejaculatory reservoir (Fig. 256), latter large, flattened dorso-ventrally, heavily sclerotized and with a number of striae

along posterior half. Reservoir with a narrow more membraneous ventral portion forming a duct merging postero-ventrally (Fig. 256) into wide base of endophallic duct (Fig. 255); latter narrowing, looping round in three small turns and finally coiling in a wide circle to apically terminate between median penal lobes.

Halyini

Brochymena arborea (Say), 1825

(Figs. 257 - 261)

Pygophore. - Dorsal border evenly arched (Fig. 257), a wide lateral flange found on either side bearing a patch of thick stout setae; ventral margin concave with a deep median U-shaped emargination.

Claspers. - Described and figured by Ruckes (1946). T-shaped (Fig. 258) in outline, stem stout flattened laterally, apically somewhat abruptly narrowed and bearing a cross-arm, situated in a dorso-ventral plane when clasper at rest in pygophore; dorsal arm of T produced into a stout hook, ventral arm blunt and shallowly bilobed apically. Base of stem bearing a small cylindrical process bearing a number of long stout setae.

Aedoeagus. - Theca cylindrical elongate (Fig. 259). One pair of broad membraneous conjunctival appendages (Fig. 259), apically produced into a blunt sclerotized point; a narrow band of sclerotization running from apex down inner margin of appendages. Median penal lobes thin rod-like (Fig. 260) basally fused to a common stem not enclosing apex of vesica.

Vesica. - Seminal duct (Fig. 261) inserted ventro-apically into a long canal (Fig. 261) lying round posterior margin of ejaculatory reservoir and opening dorso-apically into reservoir; latter large sac-like (Fig. 261) with a sclerotized apical cap. Endophallic duct (Fig. 261) basally opening into apex of reservoir, long S-shaped, apically free.

<u>Brochymena</u> <u>quadripustulata</u> (Fabricius), 1775

(Figs. 262 - 267)

Pygophore. - Figured by Crampton (1922). Dorsal border (Fig. 262) widely arched bearing medianly a narrow superior ridge; ventral border (Fig. 263) with a median V-shaped emargination into which the apex of the pygophore rests. Numerous long fine setae along dorsal and ventral margins.

Claspers. - G-shaped (Fig. 264), stem stout, produced into a curved hook, a number of long setae at base of hook.

Aedoeagus. - Theca large cylindrical (Fig. 265). One pair of conjunctival appendages (Fig. 265) small, membraneous on outer surface, slightly sclerotized on inner surface, apically acutely pointed. Median penal lobes (Fig. 266) flattened oblong plates, basally fused to a common base not closely associated with apex of vesica.

Vesica. - Very similar to that of _Brochymena arborea_, shorter (Fig. 267).

Edessini

Edessa _bifida_ (Say), 1832
(Figs. 268 - 272)

Pygophore. - Dorsal border widely arched (Fig. 268); ventral border gently concave. A pair of heavily sclerotized peg-like genital plates present, one on each side laterally on dorsal border (Fig. 269).

Claspers. - Stem broad merging into a triangular spear-like (Fig. 270) head set at 45°, inner margin finely scalloped.

Aedoeagus. - Theca (Fig. 271) heavily sclerotized elongate and cylindrical. One pair of very small sclerotized conjunctival appendages (Fig. 271), broadly hook-shaped and fused to margin of theca.

Vesica. - Ejaculatory duct (Fig. 272) consisting of a complicated series of parallel ducts (Fig. 272), their actual connections could not be worked out adequately in whole mounts even with Kumar's (1964) technique of introducing air into these canals. Seminal duct (Fig. 272) entering vesica apically. Endophallic duct (Fig. 272) short, curved.

Note. - Sections will have to be made to work out the detailed connections of seminal duct and canals within the ejaculatory reservoir.

Discocephalini

Lineostethus clypeatus (Stål), 1862
(Figs. 273 - 278)

Pygophore. - Dorsal margin (Fig. 273, 274) with two large rectangular flaps one on either side of a median V-shaped depression. Ventral border (Fig. 275) sinuous produced on either side into two narrow downwardly projecting flanges, apically acute and separated by a small U-shaped emargination. Ventral surface below margin with

a deep U-shaped depression, a row of small stout setae found along proximal margin.

Claspers. - Stem narrow cylindrical (Figs. 276, 277), apically expanded into a flat triangular plate terminating in a small heavily sclerotized spine (Fig. 276); upper surface of blade finely scalloped.

Aedoeagus. Theca pyriform (Fig. 278) with a small rim round apex. No conjunctival appendages. Median penal lobes fused into an oblong envelope-like structure enclosing basal two thirds of the endophallic duct (Fig. 278).

Vesica. - Seminal duct (Fig. 278) opening into a long canal (Fig. 278) extending round base of ejaculatory reservoir (Fig. 278) and opening dorsally. Reservoir flask-shaped, apically merging into endophallic duct (Fig. 278); latter with a heavily sclerotized collar (Fig. 278, R.) at base; apex of endophallic duct protruding from slit in median penal sheath.

Note. - The heavily sclerotized collar at the base of the endophallic duct may be some type of pumping device, no evidence has been obtained for this as yet.

Sciocorini

Sciocoris micropthalmus (Flor), 1860

(Figs. 279 - 283)

Pygophore. - Dorsal border widely concave (Fig. 279), laterally bearing one on each side, a short stout spine; ventral border deeply emarginate (Fig. 279) medianly produced into a short square process, ventral margin flattened into a lip.

Claspers. - Stem narrow (Fig. 280) bearing apically a broad spatulate plate bearing a dense matt of long setae.

Aedoeagus. - Theca elongate narrow and cylindrical (Fig. 281), apically expanded into a fan-like thecal shield (Fig. 281). One pair of conjunctival appendages (Fig. 281), basally very broad membraneous, apically divided into two lobes, a small ventral lobe with a small heavily sclerotized circular cap and a larger dorsal lobe, apically moderately sclerotized broadly rounded and bearing a matt of stout spines (not fully expanded in diagram). Median penal lobes (Fig. 282) small curved horn-like, basally fused to a common stem and enclosing apex of vesica.

Vesica. - Seminal duct inserted ventrally into a small anterior sinus (Fig. 283); an S-shaped duct from sinus connects with a sac-like ejaculatory reservoir (Fig. 283). Ejaculatory duct short broadly S-shaped, apically opening between median

penal lobes, basally continuous with anterior sinus.

Mecidini

Mecidea longula (Stål), 1854

(Figs. 284 - 286)

Pygophore and claspers described and figured by Sailer (1952).

Aedoeagus. - Figured by Sailer (1952).

Theca large and cylindrical (Fig. 284). One pair of bag-like conjunctival appendages divided into dorsal and ventral lobes, dorsal lobe (Fig. 284) apically bluntly pointed; ventral lobes (Fig. 284) shorter than dorsal, apically produced into a sclerotized point. Median penal lobes (Fig. 285) stout cylindrical structures, apically broadly rounded, basally fused together in form of a U around apex of vesica.

Vesica. - Ejaculatory reservoir (Fig. 286) large saccular. Seminal duct (Fig. 286) opening into a wide canal (Fig. 286) ventrally; latter situated on posterior margin of reservoir and opening dorso-apically. Endophallic duct (Fig. 286) basally recessed somewhat into apex of ejaculatory reservoir, apically tapering into a short narrow duct.

ASOPINAE

Zicrona caerulea (Linnaeus), 1758

(Figs. 287 - 292)

The species described by Baker (1931) has subsequently been found to be either a new taxon of specific or subspecific rank.

Pygophore. - Dorsal border (Fig. 287) medianly evenly arched bearing two small processes one on each side dorso-laterally; ventral border (Fig. 288) sinuate, bearing medianly two distinct tufts of setae borne on slight prominences. Genital plates (Fig. 287, G.pl.) crescent-shaped and bearing along inner margin and upper surface a number of stout peg-like teeth.

Claspers. - Simple blade-like (Fig. 289) apically acute.

Aedoeagus. - Theca small, tubular, produced distally into a large thecal shield (Fig. 290, Th.s.) with a deep V-shaped emargination ventrally. One pair of membraneous conjunctival appendages (Fig. 290), basally wide, apically bluntly rounded, when fully expanded, bearing a dorsal lobe. Median penal lobes (Fig. 291) broad heavily sclerotized, basally fused.

Vesica. - Seminal duct (Fig. 292) ventrally connected to a canal (Fig. 292), latter found round posterior margin of reservoir and expanding into a small chamber apically, incompletely separated from remainder of reservoir. Endophallic duct (Fig. 292) long, sinuous, basally opening into ejaculatory reservoir adjacent to seminal duct, apically terminating between median penal lobes.

Note. - Baker (1931) stated that the genital plates in the species described by him were absent. On examination they were found to be present, but are completely smooth.

<u>Oplomus</u> <u>tripustulatus</u> (Fabricius), 1803
(Figs. 293 - 297)

Pygophore. - Dorsal border (Fig. 293) gently concave with a shallow median emargination above base of proctiger. Ventral border sinuous medianly, on ventral surface is a deep heart-shaped depression. Genital plates (Fig. 293) oblong with an emargination on outer edge, surfaces ridged.

Claspers. - L-shaped (Fig. 294) apical half blade-like joined at right angles to stout stem.

Aedoeagus. - Theca small, conical, anteriorly expanded into a thecal shield (Fig. 295) almost twice as large as theca, ventral margin with a wide V-shaped incision. Two pairs of voluminous membraneous conjunctival appendages both apically broadly rounded (Fig. 295). Median penal lobes elongate, plate-like (Fig. 296), medianly fused, distally each produced into a long process.

Vesica. - Ejaculatory reservoir (Fig. 297) small, globose with a canal (Fig. 297) round posterior surface into which seminal duct (Fig. 297) opens ventrally, canal broadens dorsally into an oval chamber communicating with reservoir. Endophallic duct (Fig. 297) long, thin and sinuous, basally entering ejaculatory reservoir adjacent to seminal duct.

<u>Heterosceloides</u> <u>lepida</u> (Stål), 1862

(Figs. 298 - 302)

Pygophore. - Dorsal margin (Fig. 298) deeply concave; ventral margin slightly sinuous. A large oval pit found below median section of ventral border. Genital plates P-shaped, upper surface smooth (Fig. 298).

Claspers. - Flattened (Fig. 299), spatulate, apical margin straight, basally tapering to a short stout stem. Outer surface finely scalloped.

Aedoeagus. - Theca small, conical, proximally produced into a thecal shield (Fig. 300) with deep V-shaped emargination on ventral surface. Two pairs of conjunctival appendages: first (Fig. 300) membraneous, basally broad cylindrical, apically tapering to a blunt point; second conjunctival appendages (Fig. 300) smaller, cylindrical and membraneous, attached to a large membraneous bag-like base. Median penal lobes (Fig. 301) small flattened leaf-like structures, medianly fused, basally free and produced into two long processes.

Vesica. - Very similar in construction to Oplomus tripustulatus, endophallic duct with a U-shaped loop anteriorly (Fig. 302).

Rhacognathus americanus (Stål), 1870

(Figs. 303 - 307)

Pygophore. - Dorsal and ventral borders (Fig. 303) evenly and gently arched; genital plates (Fig. 303) small, top shaped; dorsal and ventral margins slightly crenulated.

Claspers. - Small (Fig. 304), stem short widening into a flattened triangular apex.

Aedoeagus. - Theca oblong (Fig. 305), apically expanded into a thecal shield. One pair of membraneous conjunctival appendages (Fig. 305), basally broad, apex sclerotized and acute. Median penal lobes (Fig. 306) laterally oval in outline, apically free disc-like, medianly fused by means of a cross-bar, basally free and tapering.

Vesica. - Seminal duct (Fig. 307) entering ventrally into a canal (Fig. 307) extending round posterior margin of ejaculatory reservoir and opening into a small chamber (Fig. 307) apically, latter incompletely divided by means of a septum from ejaculatory reservoir (Fig. 307). Endophallic duct (Fig. 307) looping in a wide U, opening apically between median penal lobes, basally joining reservoir adjacent to seminal duct.

<u>Apateticus</u> <u>bracteatus</u> (Fitch), 1856
(Figs. 308 - 311)

Pygophore and claspers (Fig. 308) described by Baker (1931).

Aedoeagus. - Theca oblong, produced distally into a large thecal shield (Fig. 309), lateral

margins sharply pointed, dorsal margin W-shaped, ventral margin broadly emarginate. One pair of very broad membraneous conjunctival appendages (Fig. 309), apically produced into a stout sclerotized horn. Median penal lobes (Fig. 310) oblong in shape medianly fused, basally produced into two narrow processes connected centrally by a membrane forming a hollow tube.

Vesica. - (Fig. 311). Very similar in construction to Rhacognathus americanus. Apical chamber of ejaculatory reservoir somewhat larger in Apateticus.

Apateticus lineolatus (Herrich-Schaeffer), 1839

(Figs. 312 - 316)

Pygophore. - Dorsal border (Fig. 312) with deep V-shaped emargination above proctiger; ventral margin sinuous bearing long fine setae, lying beneath ventral margin is a large oval depression part of a vertical wall between ventral border and ventral surface of pygophore. Genital plates oblong (Fig. 312) with a small pointed process on upper margin, surface of plates with three longitudinal ridges.

Claspers. - C-shaped, blade-like, apex acute, stem narrow. (Fig. 313).

Aedoeagus. - Theca small conical (Fig. 314), distally with thecal shield, (Fig. 314) latter rounded laterally and with a deep V-shaped cleft ventrally. One pair of membraneous conjunctival appendages (Fig. 314), each apically slightly sclerotized and produced into a small sharp point. Median penal lobes (Fig. 315) apically disc-like flattened, medianly fused and distally each produced into a long narrow process.

Vesica. - Very similar to *Oplomus tripustulatus*, ejaculatory duct somewhat shorter (Fig. 316).

Podisus acutissimus (Stål), 1870

(Figs. 317 - 322)

Pygophore. - Dorsal border (Fig. 317) broadly arched medianly with a superior ridge bearing two small prominences on each side bearing a tuft of stout long setae (Fig. 319, Se.). Ventral border (Fig. 318) sinuous, thickened medianly on either side of a central emargination, below this is a deep median depression. Dorsal and ventral margins covered with long fine setae. Genital plates (Fig. 319) flat triangular, inner margin broadly scalloped with a row of scalloping behind.

Claspers. - L-shaped (Fig. 320), stem short stout with a broad blade attached at right angles, apically acute and finely scalloped on lower surface.

Aedoeagus. - Theca small oblong, anteriorly produced into a thecal shield (Fig. 321), dorsally with a deep V-shaped emargination. One pair of membraneous conjunctival appendages (Fig. 321), basally broad, apically tapering to a blunt point. Median penal lobes (Fig. 321) thin oblong, fused along ventral margins forming a horseshoe-like structure around the apex of the vesica.

Vesica. - Ejaculatory reservoir (Fig. 322) with a canal extending round proximal end into an anterior chamber (Fig. 322) cut off from rest of reservoir by an incomplete septum. Seminal duct (Fig. 322) and endophallic duct (Fig. 322) entering ejaculatory reservoir adjacent to one another; endophallic duct short sinuous; seminal duct opening directly into canal.

<u>Podisus</u> <u>maculiventris</u> (Say), 1899

(Figs. 323 - 325)

Pygophore and claspers (Fig. 323) described by Baker (1931).

Aedoeagus. - Theca small, oblong, with a

large thecal shield (Fig. 324) evenly rounded laterally on apical margins, ventral margin V-shaped. One pair of membraneous conjunctival appendages, (Fig. 324) apically tapering and blunt. Median penal lobes laterally flattened, disc shaped, basally fused (Fig. 325).

Vesica. - (Fig. 325). Very similar in construction to Podisus acutissimus.

Alcaeorrhynchus grandis (Dallas), 1851
(Figs. 326 - 330)

Pygophore. - Dorsal border (Fig. 326) medianly evenly arched, laterally strongly curved and thickened; ventral border with a deep median U-shaped incision, beneath latter is an oval horizontal depression lined with short stout setae. Genital plates (Fig.326) oblong, emarginate on outer border, inner margin broadly serrate.

Claspers. - Short, stout (Fig. 327) stem apically broadened into a flat plate, upper margin emarginate.

Aedoeagus. - Theca short, compact, somewhat globose, heavily sclerotized, dorsally bearing a thecal shield (Fig. 328). Two pairs of conjunctival appendages: first membraneous (Fig. 328), wide at

base, apically tapering to a heavily sclerotized point; second conjunctival appendages (Fig. 328) shorter, basally membraneous, fused to base of first appendages, apically tapering and sclerotized. Median penal lobes (Fig. 329) heavily sclerotized, laterally flattened, apically free, basally fused to a common stout stem.

Vesica. - Ejaculatory reservoir globular (Fig. 330); seminal duct (Fig. 330) and endophallic duct (Fig. 330) entering ventrally adjacent to one another; latter long narrow and sinuous, apically opening between lateral penal lobes. Seminal duct opening into a canal (Fig. 330) extending round posterior margin of reservoir, expanding apically into a small chamber incompletely separated from rest of reservoir.

<u>Euthyrhynchus</u> <u>floridanus</u> (Linnaeus), 1767
(Figs. 331 - 334)

Pygophore. - Dorsal border (Fig. 331) with a shallow median emargination, with genital plates (Fig. 331) lying one on either side; latter elongate narrow structures, inner margins crenulate. Ventral border with two prominent projections on either side of a median U-shaped emargination.

Below ventral margin is a deep groove. Stout setae found on lateral corners of dorsal margin and ventral margin.

Claspers. - Stem of clasper (Fig. 332) triangular, distally produced into a broad flat blade, truncate apically.

Aedoeagus. - Theca small conical bearing a large rounded thecal shield (Fig. 333) deeply cleft ventrally, dorsal margin U-shaped. One pair of membraneous biramous conjunctival appendages (Fig. 333), apices blunt; a median ventral conjunctival lobe present (Fig. 333). Median penal lobes flattened, oblong plates, medianly united, basally each produced into a long process (Fig. 334).

Vesica. - Very similar to _Alcaeorrhynchus grandis_. Endophallic duct long and sinuous (Fig. 334).

Stiretrus _anchorago_ (Fabricius), 1781
(Figs. 335 - 339)

Described and figured by Pruthi (1925).

Pygophore. - Dorsal border (Fig. 335) evenly arched, ventral border with a wide median U-shaped emargination below which is a deep pit. Genital plates (Fig. 335) oblong, finely scalloped on their upper surfaces. A number of long fine setae along ventral margin.

Claspers. - Apex flattened and hastate, attached at right angles to a slender stem (Fig. 336).

Aedoeagus. - Theca small bearing distally a large thecal shield (Fig. 337) with a wide U-shaped emargination ventrally. One pair of bifid membraneous conjunctival appendages (Fig. 337), basally wide, apically produced into two small narrow rounded processes. Median penal lobes (Fig. 338) apically flattened, disc-like, centrally united around apex of vesica, basally each produced into a long process.

Vesica. - Very similar in construction to *Euthyrhynchus floridanus*. Endophallic duct long, narrow and thrown into a number of loops (Fig. 339).

Mineus strigipes (Herrich-Schaeffer), 1853
(Figs. 340 - 343)

Pygophore. - Dorsal border (Fig. 340) evenly arched; ventral border with two small projections on either side of shallow median emargination, ventral margin vertical with a wide shallow depression medianly. Genital plates large oblong (Fig. 340), dorsal and inner margins with 9-12 peg-like processes.

Claspers. - Apex triangular (Fig. 341), stem stout; apical portion of clasper bent at

approximately 120° to stem, upper surface flat and bearing a series of minute scallopings.

Aedoeagus. - Theca small,oblong, bearing distally a thecal shield (Fig. 342) with rounded lateral margins, ventrally with a deep V-shaped incision reaching margin of theca. One pair of membraneous conjunctival appendages (Fig. 342), basally very broad, apically tapering to a blunt point. Median penal lobes (Fig. 342) elongate,bluntly pointed apically, medianly fused around apex of vesica, basally each lobe produced into a free process.

Vesica. - Very similar in construction to Euthyrhynchus floridanus, endophallic duct short (Fig. 343).

Perillus confluens (Herrich-Schaeffer), 1839

No essential difference could be noted between the structure of the pygophore, aedoeagus or vesica of this species and Mineus strigipes. It is probable that Mineus should be placed in Perillus, the type material would have to be examined for final determination.

Andrallus spinidens (Fabricius), 1787

(Figs. 344 - 348)

Pygophore. - Dorsal border (Fig. 344) steeply concave and with a superior ridge (Fig. 344) covering base of proctiger, at each end of superior ridge, is a small globose genital plate (Fig. 344) with a number of small ridges on upper surface.

Ventral border sinuous, lateral edges somewhat thickened and bearing numerous long stout setae, latter also found on outer angles and inner margin of dorsal border.

Claspers. - Claw-shaped (Fig. 345), apex acute, stem short and flattened.

Aedoeagus. - Theca small, narrow with a large thecal shield (Fig. 346) one and a half times as long as theca itself, enclosing conjunctival appendages when these are not expanded, laterally rounded, deeply emarginate on dorsal and ventral surfaces. One pair of broad membraneous conjunctival appendages (Fig. 346) apex of each slightly sclerotized tapering to a blunt point; dorsal to conjunctival appendages is a single membraneous conjunctival lobe (Fig. 346). Median penal lobes (Figs. 347, 348) in lateral view somewhat oblong in outline, medianly fused, apically free, flattened, basally produced into two long

tapering processes.

Vesica. - (Fig. 348). Very similar in construction to *Rhacognathus americanus*.

PODOPINAE

Amaurochrous cinctipes (Say), 1828
(Figs. 349 - 355)

Previously described and figured by Barber and Sailer (1953).

Pygophore. - Dorsal border (Fig. 349) evenly arched; laterally pygophore bearing two large flattened processes (Figs. 349, 350; Py.ap.) pygophoral appendages, [Aypopygeal appendages of Barber and Sailer (1953); parandria of Leston (1953)] , these appendages fit into a groove on lateral margins of pygophore, each bluntly rounded and bearing a small peg-like tooth on inner dorsal margin. Ventral border with median U-shaped emargination on either side of which is a stout pointed process.

Claspers. - Very characteristic (Figs. 351, 352), consisting of a lower platform and an upper curved hook. A number of long stout setae on upper surface of platform and on outer surface of hook.

Aedoeagus. - Theca very similar to asopine type, short cylindrical and bearing a large thecal

shield (Fig. 353) not developed on ventral margin. One pair of membraneous bag-like conjunctival appendages (Fig. 353). Median penal lobes present; oblong flattened, heavily sclerotized plates (Figs. 353, 354) lying on either side of apex of endophallic duct.

Vesica. - Seminal duct (Fig. 355) opening ventrally into a canal extending round posterior margin of large globose ejaculatory reservoir (Fig. 355). Endophallic duct (Fig. 355) continuous with apex of reservoir, short, apically widening and opening between median penal lobes.

Amaurochrous dubuis (Palisot de Beauvois), 1805

No difference could be noted between the genitalia of this species and A. cinctipes strengthening the supposition made by Barber and Sailer (1953) that cinctipes is probably conspecific with dubius.

Weda parvula (Van Duzee), 1904
(Figs. 356 - 360)

Described and figured by Barber and Sailer (1953.)

Pygophore. - Dorsal border (Fig. 356) almost straight, lateral margins bearing two large flap-like pygophoral appendages (Fig. 356). Ventral border with a shallow median emargination on either side of which is a small broadly rounded process.

Claspers. - Small (Fig. 357) very similar to *Amaurochrous cinctipes*.

Aedoeagus. - Theca small, cylindrical, bearing a large thecal shield (Fig. 358). One pair of membraneous balloon-like conjunctival appendages (Fig. 358). Median penal lobes (Fig. 358) heavily sclerotized somewhat broadly hook shaped, flattened laterally and lying on either side of vesica (Fig. 359).

Vesica. - Ejaculatory reservoir (Fig. 360) bulb-like, simple, apically continuous with a short endophallic duct (Fig. 360); a shallow canal (Fig. 360) extends from ventro-apical entrance of seminal duct (Fig. 360) round posterior margin to dorso-apical region of ejaculatory reservoir; seminal duct opening into this canal ventrally.

Oncozygia clavicornis (Stål), 1872

(Figs. 361 - 366)

Clasper and aedoeagus figured by Barber and Sailer (1953).

Pygophore. - Very similar (Fig. 361) to Weda parvula.

Claspers. - Biramous (Fig. 362) one arm forming a blunt process, the other broadened into a flat platform bearing a fringe of long setae. Stem very short almost nonexistent.

Aedoeagus. - Theca small cylindrical bearing distally a thecal shield. (Fig. 363). One pair of membraneous and balloon-like conjunctival appendages (Fig. 363). (See Sailer (1953) Fig. 18, for expanded view of conjunctival appendages). Median penal lobes (Fig. 365) flattened plates fused into a horseshoe-like structure (Fig. 364) round apex of vesica.

Vesica. - Ejaculatory reservoir (Fig. 366) small globular with a canal (Fig. 366) extending round posterior margin to dorso-apical half of reservoir. Seminal duct (Fig. 366) opening ventrally into canal; endophallic duct short (Fig. 366) sinuous, apically terminating between median penal lobes.

4.22. TESSARATOMIDAE

ONCOMERINAE

Piezosternum subulatum (Thunberg), 1783

(Figs. 367 - 372)

Pygophore. - Dorsal border deeply concave, ventral margin shallowly concave bearing medianly a heavily sclerotized oblong process (Fig. 367; Pro.). Ventral surface of pygophore produced into a large scoop-like platform (Fig. 367; Pt.) projecting some way beyond the ventral margin. Outer angles of this platform with a small patch of short heavily sclerotized setae (Fig. 368).

Claspers. - Simple, spatulate (Fig. 369), slightly curved. A number of long stout setae on outer apical surface.

Aedoeagus. - Theca (Fig. 370) squat and somewhat lopsided being produced into shield-like projection on ventral margin. Two conjunctival appendages: first (Fig. 370) heavily sclerotized, oblong, thin and flap-like lying laterally at base of conjunctiva; second conjunctival appendages (Fig. 370) lying above first, divided into two broadly rounded lobes, dorsal most lobe entirely membraneous, ventral most lobe lightly sclerotized.

Vesica. - Consisting of a long membraneous tubular lobe, apically tapering to a fine needle-like point. Internally vesica very complex consisting of an ejaculatory reservoir (Fig. 371) divided into dorsal and ventral chambers, connected anteriorly by means of a short spiral duct (Fig. 370; Sp. du.) and posteriorly through a wide canal. Dorsal chamber (Fig. 370) oval in outline attached directly to bases of second conjunctival appendages; ventral chamber (Fig. 370) C-shaped. Seminal duct (Fig. 370) opening into apex of ventral chamber. Endophallic duct continuous with apex of ventral chamber, extremely long thin and highly coiled tube, apically becoming straight and tapering into a very fine duct opening at apex of vesica (Fig. 372).

Note. - The genitalia of this species resemble very closely those of P. calidum (Fabricius) described by Leston (1954). It may be noted here that Leston states that there are three pairs of conjunctival appendages in P. calidum but does not show them on his diagram.

4.23. ACANTHOSOMIDAE

Meadorus lateralis (Say), 1831

(Figs. 373 - 377)

Pygophore (Fig. 373) and claspers (Fig. 374) previously described and figured by Baker (1931).

Aedoeagus. - Theca squat and tub-shaped (Fig. 375). Two pairs of conjunctival appendages: first (Fig. 375) flattened, leaf-like slightly sclerotized; second conjunctival appendages (Fig. 376), acentric, consisting of three flattened leaf-like lobes arranged around vesica, one lobe considerably longer than other two.

Vesica. - Seminal duct (Fig. 377) opening ventrally into a globular ejaculatory reservoir (Fig. 377), latter bearing a pair of processes (Fig. 377; Pro.) on apico-dorsal surface to which bases of first conjunctival appendages are attached. Endophallic duct (Fig. 377), long narrow and looped in a wide S, apically tapering to a very fine thread-like duct, basally merging with apex of ejaculatory reservoir.

Elasmostethus cruciatus (Say), 1831
(Figs. 378 - 382)

Pygophore. - (Fig. 378) and claspers (Fig. 379) previously described and figured by Baker (1931).

Aedoeagus. - Theca with a large rounded dorsal diverticulum (Fig. 380; D.dv.) (described as ventral by Leston (1953) for *Elasmostethus interstinctus*), squat and tub-shaped. One pair of sclerotized flattened and leaf-like conjunctival

appendages (Fig. 380) apically acute.

Vesica. - Consisting of a large membraneous cylindrical lobe (Fig. 380) bluntly rounded and bearing a rounded median dorsal process (Fig. 380; D.pr.). Opening of ejaculatory duct diffuse, consisting of a small crenulated lobe about a third of the way up on ventral surface (Fig. 381; Gp.). Ejaculatory reservoir (Fig. 382) found at base of vesical lobe generally withdrawn into theca, globular and divided by means of a septum into two chambers. Seminal duct (Fig. 382) opening into posterior chamber, latter connected directly to anterior chamber. Endophallic duct (Fig. 382) long, looped basally merging into apex of anterior chamber, apically widening and forming a diffuse opening on ventral margin of vesica.

Note.-The genitalia of this species resembles very closely those of E. interstinctus described and figured by Leston (1953).

4.24. CYDNIDAE

CORIMELAENINAE

Corimelaena pulicaria (Germar), 1839

(Figs. 383 - 387)

Pygophore. - Dorsal border diffuse medianly; ventral border almost straight. Pygophoral opening

small surrounded by a wide flange dorsally and laterally (Fig. 383).

Claspers. - Very small chisel-like (Fig. 384), a number of very small setae along apical margin.

Aedoeagus. - Theca small squat and broad, bearing a pair of spiny processes (Fig. 385) one on each side on dorsal surface near base. Laterally apical margin bears a pair of thin flat wing-like appendages one on each side (Fig. 385; Th.ap.). Three pairs of conjunctival appendages: first moderately sclerotized, basally wide, tapering apically into a curved horn (Fig. 386); second conjunctival appendages smaller, moderately sclerotized, flattened, triangular in outline (Fig. 386), apex blunt, outer margins serrate; third conjunctival appendages chisel-like (Fig. 386) lying inside the second, lightly sclerotized.

Vesica. - Very simple. Seminal duct (Fig. 387) connected ventrally to a simple saccular ejaculatory reservoir (Fig. 387). Endophallic duct (Fig. 387) short, curved, basally merging with apex of reservoir.

CYDNINAE

Sehirini

<u>Sehirus</u> <u>cinctus</u> (Palisot de Beauvois), 1805

(Figs. 388 - 390)

Genitalia described by Froeschner (1960).

Pygophore. - Dorsal border evenly arched medianly, laterally sinuous; ventral border gently concave. Pygophoral opening surrounded by a wide flange (Fig. 388).

Claspers. - Figured by Froeschner (1960, Fig. 188). Stem slender, short, bearing a narrow sickle-shaped blade; a tuft of long setae situated at base of blade.

Aedoeagus. - Theca long cylindrical, basally membraneous, apically becoming lightly sclerotized; two small elongate heavily sclerotized flanges (Fig. 389; Th.f.) found laterally one on each side of theca. One pair of conjunctival appendages, membraneous and bilobed (Fig. 389).

Vesica. - Very small lying at base of theca, consisting of a simple sac-like ejaculatory reservoir (Fig. 390) which apically merges into a short straight ejaculatory duct (Fig. 390). Seminal duct (Fig. 390) attached ventrally to base of endophallic duct, latter opening at base of a median canal formed

from bases of conjunctival appendages.

Note. - The aedoeagus of this species bears no resemblance to that of Sehirus sp. described by Pruthi (1925).

Cydnini

Pangaeus aethiops (Fabricius), 1787
(Figs. 391 - 397)

Pygophore (Fig. 391), previously figured and described by Froeschner (1960).

Claspers. - Peculiar in possessing two distinct sections (Fig. 392); clasper proper (Fig. 393) flattened leaf-like, outer margin with a number of long fine setae; attached to this dorsally is a tubular arm (Fig. 392; Ar.cl.; 394) the function of which is unknown.

Aedoeagus. - Theca long, tubular (Fig. 395), heavily sclerotized, dorsal margin produced into a lip. Three pairs of conjunctival appendages: first conjunctival appendages very small cylindrical membraneous (Fig. 395); second fused into a membraneous tube (Fig. 395) bearing apically a pair of heavily sclerotized pads (Fig. 396); third conjunctival appendages when fully inflated balloon-like (Fig. 395), totally membraneous, apically produced into a blunt finger-like process.

Vesica. - Very heavily sclerotized. Seminal duct (Fig. 397) connecting into base of endophallic duct; a long highly convoluted duct extending from entrance of seminal duct and merging posteriorly into a saccular ejaculatory reservoir (Fig. 397). Endophallic duct short, sinuous (Fig. 397), basally a long duct running above convoluted duct and opening into ejaculatory reservoir.

Note. - This type of vesica resembles closely the type found in the tribe Scutelleraria (Scutellerinae).

<u>Cyrtomenus</u> <u>crassus</u> (Walker), 1867
(Figs. 398 - 401)

Pygophore. - Dorsal margin broad covered with fine setae (Fig. 398). Ventral margin widely U-shaped not connected with dorsal margin.

Claspers. - Figured by Froeschner (1960). Broad flattened with a small tooth apically (Fig. 399); apical margin broadly impressed bearing a large number of long fine setae; inner lateral margin with an oval area finely scalloped.

Aedoeagus. - Theca cylindrical (Fig. 400) very heavily sclerotized. One pair of short stout heavily sclerotized conjunctival appendages (Fig. 400) ventral to vesica.

Vesica. - Bearing a long thin tubular infravesicular process on ventral surface (Fig. 401; Ve.pr.); seminal duct (Fig. 401) opening ventrally into base of endophallic duct, latter moderately long, straight, (Fig. 401) ensheathed in a stout tapering tube. Ejaculatory reservoir (Fig. 401) flattened tube-like connected by means of a short spiral duct (Fig. 401) to ejaculatory duct.

Melanaethus subglaber (Walker), 1867
(Figs. 402 - 405)

Pygophore. - Dorsal border broadly arched (Fig. 402) ventral border gently concave. Pygophoral opening with a wide flange on dorsal and lateral margins.

Claspers. - Figured by Froeschner (1960, Fig. 213), somewhat triangular in outline with numerous hairs on thickened apical margin.

Aedoeagus. - Theca elongate, tubular (Fig. 403). Two pairs of conjunctival appendages: first (Fig. 403) basally membraneous apically heavily sclerotized and blunt; ventralmost conjunctival appendages (probably third) (Fig. 404) basally fused, apically produced into two small broadly rounded lobes, sclerotized throughout.

Vesica. - Small; seminal duct (Fig. 405) connected ventrally to base of ejaculatory duct; latter a short straight tube surrounded by a stout sheath (Fig. 405), tapering apically; basally endophallic duct merging into an unusual spiral ejaculatory reservoir (Fig. 405).

Amnestini

Amnestus *pallidus* (Zimmer), 1910
(Figs. 406 - 410)

Pygophore. - Dorsal border evenly arched, ventral border concave (Fig. 406). Pygophoral opening surrounded by a wide flange.

Claspers. - Stem short narrow (Fig. 407), widening medianly, apically produced into an acute point. A number of fine setae scattered over outer surface of clasper.

Aedoeagus. - Theca small, membraneous, globose (Fig. 408). Two pairs of conjunctival appendages: first divided (Fig. 409) into two pairs of small spike-like appendages, apically slightly sclerotized; second conjunctival appendages (Fig. 409) large bag-like, lightly sclerotized (probably balloon shaped when fully inflated). All appendages attached to fairly voluminous conjunctiva.

Vesica. - Seminal duct (Fig. 410) very

fine, opening ventrally into a long canal at apex of vesica; canal (Fig. 410) merging into an internal duct opening into ejaculatory reservoir (Fig. 410). Endophallic duct (Fig. 410) long, basally merging with apex of central sinus.

5. MORPHOLOGY OF FEMALE GENITALIA

5.1. Introduction

The female genitalia are not as complex as those of the male. Detailed diagrams and descriptions are not given for each species since the genitalia generally do not vary in very great detail. Scudder (1959) has described the genitalia of this group fully and any divergence from his general descriptions has been noted. The spermatheca of each species was studied in more detail and provides some useful characters which give some good clues as to the relationship of the various groups.

The female genitalia are situated on abdominal segments eight and nine and are of the plate-shaped type with a posterior or postero-ventral aspect. The paratergites of segments eight and nine, together with the first gonocoxae (segment 8), form the major part of the external genitalia. The second gonocoxae (segment 9) generally form a bridge-like sclerite beneath sternum 10. The gonapophyses attached to the gonocoxae are generally membraneous. The gonangulum is fused posteriorly to tergum 9. In some species the dorsal edge of the first gonapophysis is heavily sclerotized and

forms the grooved outer ramus. The ventral edge of the second gonapophysis is in some species also heavily sclerotized and forms the inner ramus.

5.2. Descriptions

5.21. PENTATOMIDAE

SCUTELLERINAE

Odontoscelini

Genitalia externally plate-like very similar in all species. Descriptions are given by several authors, detailed descriptions will not be included here.

<u>Fokkeria producta</u> (Van Duzee), 1904

(Figs. 411, 412)

<u>Euptychodera corrugata</u> (Van Duzee), 1904

(Figs. 413, 414)

Genitalia of these two species almost identical. Genital chamber with a deep median sclerotized groove (Fig. 413; Gr.) at dorsal end of which is a small membraneous pouch into which spermatheca opens. Spermathecal duct long leading into a pumping region poorly defined from spermathecal bulb, proximal flange of pump developed (Fig. 414; P.f.), lightly sclerotized. The shape of

the spermathecal bulb differs in the two species being somewhat more elongate in *Fokkeria* than in *Eyptychodera*.

Vanduzeeina balli (Van Duzee), 1904
(Figs. 415, 416)

Very similar to *Fokkeria producta* spermathecal duct long (Fig. 416; S.du.) membraneous, spermathecal bulb elongate cylindrical. (Fig. 416; B).

Phimodera binotata (Say), 1824
(Figs. 417, 418)

Entrance of spermatheca into genital chamber surrounded by a circular sclerite (Fig. 418; Sc); a short groove extending along base of chamber from this sclerite.

Spermathecal duct short opening into a large tough sac-like dilation (Fig. 417; Dl.); from latter a short duct connects to pumping region with proximal flange (Fig. 417) only developed. Spermathecal bulb dumbell-shaped (Fig. 417).

Eurygasterini

Eurygaster alternata (Say), 1828
(Fig. 419)

External genitalia flattened and facing ventrad

similar to Pentatomine type. Internally a pair of sclerotized interlocking rami present similar to those found in Scutellerini (McDonald, 1963). Second gonocoxae lightly sclerotized elongate plates, not fused centrally. Genital chamber with a long sclerotized groove (Fig. 419).

Spermathecal duct short; pumping region (Fig. 419; P.) with flanges indicated only by slight swellings for muscle attachment; spermathecal bulb (Fig. 419) spherical separated from pump by a short duct.

Note. - This species is quite distinct in possessing sclerotized rami.

Pachycorini

The external genitalia are essentially very similar. Minor differences exist among species and these are described.

Pachycoris torridus (Scopoli), 1722
(Figs. 420, 421)

Visible portion of first gonocoxae reduced, bases hidden beneath seventh sternum. Opening of spermatheca (Fig. 420; O.) into genital chamber surrounded by a heart shaped sclerite; a deep median sclerotized groove extending along length

of genital chamber from this sclerite. Spermathecal duct with a large spherical dilation (Fig. 421) pumping region small with distal (Fig. 421; D.f.) and proximal flanges developed, spermathecal bulb elongate cylindrical.

Diolcus irroratus (Fabricius), 1775
(Figs. 422-424)

Genital chamber with a narrow, heavily sclerotized groove (Fig. 423) anteriorly opening into a heavily sclerotized pouch (Fig. 422; Pch.) into which spermatheca opens; spermathecal duct short stout dilating into a thick walled chamber (Fig. 424) from which apically a short membraneous duct leading to a pump with proximal flange only developed; spermathecal bulb elongate cylindrical (Fig. 424).

Tetyra antillarum (Kirkaldy), 1909
(Figs. 425 - 427)

First gonocoxae (Fig. 425; 1Gx.) each with a large sclerotized base projecting internally beneath sternum seven. A large anchor-shaped sclerite (Fig. 426; Sc.) present around opening of spermatheca into genital chamber. Spermathecal

duct narrow membraneous with a large membraneous sac-like diverticulum (Fig. 426; Dt.), pumping region small, proximal and distal flanges (Fig. 427) developed, spermathecal bulb globose (Fig. 427) connected by a short duct to pump.

Symphylus _carribeanus_ (Kirkaldy), 1909

(Fig. 428)

A long, heavily sclerotized plate-like sclerite extending along base of genital chamber (Fig. 428; Gr.) from entrance of spermatheca. Spermathecal duct basally broad expanding into a globular dilation, (Fig. 428) from which a narrow duct connects to pumping region; latter with both flanges developed and connected by means of a moderately long stout duct to a spherical spermathecal bulb.

Sphyrocoris _obliquus_ (Germar), 1839

(Figs. 429, 430)

Very similar to _Homaemus_ _aeneifrons_

Dilation smaller, pumping region not clearly differentiated (Fig. 429), proximal flange only developed. Spermathecal bulb continuous with pump, elongate cylindrical (Fig. 430).

Homaemus aeneifrons (Say), 1824

(Figs. 431, 432)

Sclerotized groove (Fig. 431) present in base of genital chamber spermathecal duct marked by numerous annulations; pumping region (Fig. 432) poorly defined, proximal flange present, membraneous; distal flange missing; spermathecal bulb elongate, S-shaped (Fig. 432).

Acantholomidea porosa (Germar), 1839

(Figs. 433 - 435)

Eighth paratergites absent, ninth narrow and elongate (Fig. 433; Pt.g.). Spermatheca opening into base of heavily sclerotized groove (Fig. 434) lying in base of genital chamber, a sac-like spermathecal diverticulum also opening into this groove adjacent to spermathecal entrance. Spermathecal duct medianly with a sac-like dilation, pumping region small with proximal flange only developed; spermathecal bulb elongate and rod-like (Fig. 435).

Chelysomidea guttata (Herrich-Schaeffer), 1839

(Figs. 436 - 438)

First gonocoxae (Fig. 436) triangular, smaller than other species examined in this tribe; internally a pair of sclerotized outer rami (Fig. 436; O.r.) present. Spermatheca opening into a pouch (Fig. 437) with a heavily sclerotized lip on proximal surface, running from latter is a heavily sclerotized groove. Spermatheca minute, duct long, narrow passing to a small pumping region (Fig. 438), proximal flange reduced, distal flange present, spermathecal bulb elongate sausage-like.

This species is distinct from other members of this tribe in possessing one pair of rami.

Stethaulax marmoratus (Say), 1831

(Figs. 439 - 442)

A long heavily sclerotized groove extending along base of genital chamber (Fig. 440) from spermathecal opening. Spermathecal duct long with a large saccular diverticulum (Fig. 441) attached mid-way; pumping region small (Fig. 442), proximal flange well developed, distal flange very small; spermathecal bulb oval connected to pump by a short duct.

Scutellerini

Augocoris _gomesii_ (Burmeister), 1835
(Fig. 443)

External genitalia plate-like, typically Scutellerine (Scudder, 1959). Sclerotized and interlocking rami present.

Spermatheca typical for members of this tribe. Spermathecal duct (Fig. 443) medianly expanded into a heavily sclerotized globular chamber with a series of fine markings externally; pumping region well developed (Fig. 443) connected to spermathecal dilation by a short duct; spermathecal bulb elongate apically expanded into a spherical bulb (Fig. 443).

Note. - This species is very similar to other members of this tribe in possessing sclerotized rami (Scudder, 1959; McDonald, 1963) and the large sclerotized median dilation of the spermathecal duct (Pendergrast, 1956).

PENTATOMINAE

The external genitalia are all very similar in this sub-family and are described by Scudder (1959). The presence or absence of spiracles on the eighth paratergites varies from species to

species. Sclerotized rami are entirely lacking, ring sclerites were found in the two European species studied, *Pentatoma rufipes*, and *Eysarcoris aeneus*.

The spermatheca has been described by Pendergrast for several species and is remarkably constant in construction. The spermathecal duct is expanded into a large elongate balloon-like dilation (Fig. 474; Dl.) down the centre of which is a sclerotized rod (Fig. 474; R.) varying in thickness from species to species. The apex of this rod is free and a narrow channel extends down the centre and basally emerges from the diverticulum as a narrow duct connecting with the pumping region and spermathecal bulb. The pumping region has well defined proximal and distal flanges for the insertion of muscles and is attached directly to the spermathecal bulb. The shape of the latter varies somewhat but in the majority of species is spherical or oval. One exception only to this general pattern was found in *Trichopepla semivittata*, in this species the spermatheca consists of a long duct terminating in a membraneous sac with no differentiation of pumping region or bulb (Fig. 476).

Any variation from the general pattern described above will be noted under each specific description.

Pentatomini

Rhytidolomia senilis (Say), 1831
(Figs. 444, 445)

Rhytidolomia viridicata (Walker), 1867
(Fig. 446)

Rhytidolomia saucia (Say), 1831

Chlorochroa ligata (Say), 1831

Eighth paratergites with spiracles. Second gonocoxae fused into a single plate. Second gonapophyses found above the spermathecal entrance (Fig. 444; 2 Gp.) and two small sclerites surround the opening of the spermatheca (Fig. 444; Sc.) into the genital chamber. Spermatheca as described above.

Banasa dimidiata (Say), 1831
(Fig. 447)

Carpocoris remotus (Horvath), 1907
(Fig. 448)

Murgantia histrionica (Hahn), 1834
(Figs. 449, 450)

Padaeus viduus (Vollenhoven), 1868

Eighth paratergites with spiracles. Two small sclerites surrounding opening of spermatheca. In case of *Murgantia histrionica*, these sclerites are somewhat larger (Fig. 450), the ventralmost sclerite forming a platform and the smaller dorsal sclerite forming a spout round the spermathecal

opening. Spermatheca normal, shape of spermathecal bulb varies from species to species.

Mormidea lugens (Fabricius), 1775

Euschistus tristigmus (Say), 1831
(Fig. 452)

Hymenarcys nervosa (Say), 1832

Cosmopepla bimaculata (Thomas), 1865
(Figs. 453, 454)

Menecles insertus (Say), 1831

Brepholoxa heidmanni (Van Duzee), 1904
(Figs. 455, 456)

Dendrocoris humeralis (Uhler), 1877
(Fig. 457)

Coenus delius (Say), 1831

Eysarcoris intergressus (Uhler), 1893

Prionosoma podopioides (Uhler), 1863
(Figs. 458, 459)

Solubea pugnax (Fabricius), 1775
(Figs. 460, 461)

Eighth paratergites without spiracles. Entrance of spermatheca surrounded by one or two small sclerites. Spermatheca as described under general heading, shape of spermathecal bulb varies in each species as does the size and shape of the flanges of the pumping region.

Neottiglossa trilineata (Kirby), 1837
(Fig. 462)

Loxa flavicollis (Drury), 1773
(Fig. 463)

Nezara viridula (Linnaeus), 1758

Arvelius albopunctatus (De Geer), 1773
(Figs. 464, 465)

Aelia americana (Dallas), 1851
(Fig. 466)

Acrosternum pennsylvanicum (De Geer), 1773
(Figs. 467, 468)

Peribalus limbolarius (Mulsant and Rey), 1866
(Figs. 469, 470)

Vulsirea violacea (Fabricius), 1803
(Figs. 471, 472)

Pentatoma rufipes (Linnaeus), 1758
(Figs. 473, 474)

Chlorocoris subrugosus (Stål), 1872
(Fig. 475)

All the above species are characterized by the fact that the spermathecal bulb possess from 2-4 hollow horn-like processes (Fig. 474; Pr.) on it, these vary in size and shape being long and slender in *Chlorocoris subrugosus*, small and squat in *Peribalus limbolarius*. *Nezara viridula* has been described and figured by Pendergrast (1957). The spermatheca is otherwise normal in possessing a median dilation with central sclerotized rod, spermathecal opening surrounded by one or two sclerites. *Pentatoma rufipes* possess in addition

ring sclerites, this species is palaearctic in distribution. Presence or absence of spiracles varies (see Table 5).

Peribalus limbolarius (Fig. 461), Nezara viridula, Aelia americana (Fig. 466), Acrosternum pennsylvanicum (Fig. 468) and Pentatoma rufipes all possess two processes on the spermathecal bulb.

Neottiglossa trilineata, Chlorocoris subrugosus, Loxa flavicollis (Fig. 463) and Arvelius albopunctatus possess three appendages. Vulsirea violacea has four appendages.

The function of these processes is unknown.

Trichopepla semivittata (Say), 1832
(Fig. 476)

Eighth paratergites with spiracles. First gonapophyses sclerotized. Spermatheca simple, consisting of a narrow duct terminating in a simple membraneous sac (Fig. 476), no pumping region present.

Proxys punctulatus (Palisot de Beauvois), 1805
(Fig. 477)

Eighth paratergites without spiracles. Spermathecal dilation constructed anteriorly

(Fig. 477) giving it a bottle shape, otherwise spermatheca similar to standard description.

Thyanta perditor (Fabricius), 1794

(Figs. 478, 479)

Eighth paratergites with spiracles. A small circular sclerite surrounding opening of spermatheca. Spermathecal dilation (Fig. 478) elongate bearing proximally a bulbous cap within which sclerotized rod expanded into a bell shaped apex. Proximal to pumping region, duct swollen into a sclerotized bulb (Fig. 479; B.d.) with a number of transverse ridges, spermathecal bulb very elongate rod-like (Fig. 479).

Eysarcoris aeneus (Scopoli), 1763

(Fig. 480)

Eighth paratergites without spiracles.. Two ring sclerites (Fig. 480; R.sc.) present one on either side of a V-shaped sclerite surrounding spermathecal opening. Spermathecal dilation constricted proximally forming a large distal chamber (Fig. 480; Dl.$_1$) and a smaller more elongate proximal chamber (Fig. 480; Dl.$_2$), spermatheca otherwise normal.

Note. -- This is a European species and shows marked differences from the American species *Eysarcoris intergressus* which fact has already been noted in the description of the male genitalia.

Halyini

Brochymena quadripustulata (Fabricius), 1775

(Fig. 481)

Brochymena arborea (Say), 1825

Eighth paratergites with spiracles. First gonapophyses sclerotized; second gonocoxae fused plate-like. Opening of spermatheca surrounded by two sclerites (Fig. 481). Spermathecal bulb with two processes in *Brochymena quadripustulata*; B. *arborea* with an additional small third appendage. Spermatheca in other respects similar to general description under Pentatomini.

Edessini

Edessa bifida (Say), 1832

(Fig. 482)

Eighth paratergites with spiracles; second gonocoxae fused. Spermatheca similar to *Brochymena quadripustulata* spermathecal bulb with three

processes of equal size.

Sciocorini

Sciocoris micropthalmus (Flor), 1860
(Fig. 483)

Eighth paratergites without spiracles, external genitalia typically Pentatomine in character. Base of spermathecal duct surrounded by a small horseshoe shaped sclerite (Fig. 483) with a second crescent shaped sclerite in front of it, spermatheca as described under Pentatomini.

Discocephalini

Lineostethus clypeatus (Stål), 1862
(Fig. 484)

Eighth paratergites with spiracles. Ninth paratergites small oval structures; second gonocoxae fused, narrow. Entrance of spermatheca surrounded by a small circular sclerite, otherwise similar to *Sciocoris micropthalmus*, duct from spermathecal dilation to pumping region wider, longer and convoluted (Fig. 484).

Mecidini

Mecidea longula (Stål), 1854
(Fig. 485)

Eighth paratergites with spiracles, ninth vertical projecting beyond posterior margin (Fig. 485); spermatheca similar to *Sciocoris micropthalmus*.

ASOPINAE

Mineus strigipes (Herrich-Schaeffer), 1853
(Figs. 486, 487)

Rhacognathus americanus (Stål), 1870
(Fig. 488)

Oplomus tripustulatus (Fabricius), 1803

Andrallus spinidens (Fabricius), 1787

Podisus acutissimus (Stål), 1870
(Figs. 489, 490)

Podisus maculventris (Say), 1899
(Fig. 491)

Apateticus lineolatus (Herrich-Schaeffer), 1839
(Fig. 492)

Stiretrus anchorago (Fabricius), 1781

Heterosceloides lepida (Stål), 1862

Perillus confluens (Herrich-Schaeffer), 1839
(Fig. 493)

Alcaeorhyncus grandis (Dallas), 1851
(Fig. 494)

Euthyrhynchus floridanus (Linnaeus), 1767
(Fig. 495)

Zicrona caerulea (Linnaeus), 1758
(Figs. 496, 497)

All the above species were examined and presented a remarkably uniform picture in the structure of the female genitalia and agree with the general description given by Scudder (1959) for Pentatomidae.

The spermathecae were also extremely uniform and resemble *Hoploxys coeruleus* Dallas figured by Pendergrast (1956). Minor variations in the size and shape of the spermathecal bulb were found. Eighth paratergites with spiracles, second gonocoxae fused (Figs. 486, 496), heavily sclerotized and visible externally as a trapezoidal plate; no rami present.

Spermatheca of typical Pentatomine construction. One or two small sclerites found round the entrance of the spermatheca into the genital chamber (Fig. 492); medianly spermatheca dilated into an elongate chamber down the centre of which runs a heavily sclerotized rod, a narrow duct passing along centre of rod and out of dilation to a well developed pumping region with proximal and distal flanges, spermathecal bulb attached directly to pump, varying in shape from species to species (see figures).

Euthyrhynchus floridanus is unique in possessing a pair of ring sclerites one on either side of the spermathecal opening, also the distal flange is absent in the pumping region, otherwise similar to previous species.

PODOPINAE

Amaurochrous dubius (Palisot de Beauvois) 1805

(Figs. 498, 499)

Amaurochrous cinctipes (Say), 1828

Genitalia typically Pentatomine in construction. Eighth paratergites ventrally not fused, without spiracles (Fig. 498). Spermathecal bulb with three processes (Fig. 499) spermatheca otherwise similar to that described under Pentatomini.

Weda parvula (Van Duzee), 1904

(Fig. 500)

Genitalia and spermatheca very similar to preceding species, spermathecal bulb with two processes only (Fig. 500).

TESSARATOMIDAE

ONCOMERINAE

Piezosternum subulatum (Thunberg), 1783

(Figs. 501, 502)

Eighth and ninth paratergites long apically acute sclerites (Fig. 501) eighth with spiracles. Sclerotized and paired rami present, second gonocoxae fused plate-like second gonapophyses partially sclerotized. Ring sclerites present (Fig. 502; R.sc.), also noted by Scudder (1959) in *Piezosternum calidum*.

Spermathecal duct wide on entrance into genital chamber (Fig. 502) slightly sclerotized at base, long coiled terminating in a pumping region with proximal and distal flanges; spermathecal bulb heavily sclerotized oval in shape attached directly to pump.

Note. - The spermatheca of this species differs from *Musgravea* (*Rhoecocoris*) *sulciventris* figured by Pendergrast (1956), also a member of the Ocomerini, in not possessing a spermathecal diverticulum but does resemble the other three species figured.

ACANTHOSOMIDAE

Elasmostethus cruciatus (Say), 1831
(Figs. 503, 504)

External genitalia similar to Acanthosoma haemorrhoidale described by Scudder (1959), tenth sternum divided (Fig. 503; S.10); paired and sclerotized rami present.

A small sclerotized groove found in floor of genital chamber extending, between entrance of spermatheca and that of oviduct. Spermatheca (Fig. 504) consisting of a narrow duct terminating in a pumping region with proximal and distal flanges; spermathecal bulb cylindrical.

Meadorus lateralis (Say), 1831
(Fig. 505)

Genitalia and spermatheca (Fig. 505) very similar to Elasmostethus cruciatus; eighth paratergites divided; distal and proximal flanges of pump well developed.

CYDNIDAE

CORIMELAENINAE

Corimelaena pulicaria (Germar), 1839
(Figs. 506, 507)

Paratergites eight fused centrally (Fig.

506; Pt. 8); two pairs of elongate sclerites visible above the large flap-like first gonocoxae (Fig. 506), tenth sterite (Fig. 506) being dorsalmost, ninth paratergites lying beneath (Fig. 506). Second gonocoxae not visible externally. No sclerotized rami or ring sclerites present.

Spermatheca (Fig. 507) consisting of a simple duct connecting to pumping region with proximal flange only developed; spermathecal bulb mushroom shaped (Fig. 507), attached directly to pump.

Galgupha nitiduloides (Wolff), 1802
(Figs. 508, 509)

External genitalia very similar to Corimelaena pulicaria. No sclerotized rami.

Spermatheca very similar to that figured and described by Pendergrast (1956) for Galgupha ovalis, shape of spermathecal bulb differs somewhat. (Fig. 509). Two accessory sacs present one on either side of spermathecal entrance (Fig. 508; A. s.), their function unknown; spermathecal opening into a narrow sclerotized groove (Fig. 508).

CYDNINAE

Cydnini

Dallasiellus discrepans (Uhler), 1877
(Figs. 510, 511)

Ovipositor facing caudad. Eighth paratergites (Fig. 510) not fused medianly. An elongate narrow sclerite found dorsally lying between eighth paratergites probably representing remains of the bridge between them. Tenth sternum (Fig. 510) divided; ninth paratergites small oblong (Fig. 510) lying on either side of fused second gonocoxae (Fig. 510), latter clearly visible as a crescent shaped sclerite (Fig. 510) almost divided into two by a deep ventral cleft; bases of second gonapophyses (Fig. 510) visible. First gonocoxae (Fig. 510) large plate-like. Sclerotized rami present; ring sclerites present.

Spermatheca quite unlike any figured by Pendergrast (1956) for Cydnidae. Spermathecal duct broad, becoming somewhat dilated distally and bearing internally a short, stout, sclerotized rod, a narrow duct passing down the centre of this rod and into a broader coiled duct, passing to pumping region (Fig. 511) from dilation, pump with well developed proximal and distal flanges; spermathecal bulb pear-shaped (Fig. 511).

Cyrtomenus crassus (Walker), 1867

(Figs. 512, 513)

External genitalia (Fig. 512) very similar to *Dallasiellus discrepans*; eighth paratergites joined medianly by a very narrow bridge; bases of second gonocoxae not visible externally. Sclerotized rami present; no ring sclerites.

Spermatheca differing somewhat from that of *Dallasiellus discrepans* although built along same lines. Spermathecal duct (Fig. 513) basally wide, narrow medianly, and distally expanding into a globular chamber within which is a second globular chamber, longitudinally ridged; a stout sclerotized duct originating from inner chamber and linking external chamber to pump; latter with well developed distal and proximal flanges (Fig. 513); spermathecal bulb oval attached directly to pump.

Pangaeus aethiops (Fabricius), 1787

(Fig. 514)

External, internal genitalia and spermatheca (Fig. 514) similar to *Dallasiellus discrepans*. Internal rod of spermathecal diverticulum much less heavily sclerotized; spermathecal bulb globular (Fig. 514).

Amnestini

Amnestus pallidus (Zimmer), 1910

(Figs. 515, 516)

External genitalia most unusual, described and figured by Froeschner (1960). Eighth paratergites small V-shaped structures lying (Fig. 515) one on either side laterally. Greater part of external genitalia consisting of a large triangular sclerite surrounding an oval anal aperture (Fig. 515; An.), probably representing fused ninth paratergites and tenth sternum. First gonocoxae laterally placed, moveable, partly hidden by the margin of the seventh sternum.

Base of spermathecal duct narrow opening into a small mound or evagination of genital chamber; a small accessory spermathecal diverticulum (Fig. 516) opening into base of spermathecal duct. Medianly spermathecal duct widening and thrown into two or three tight coils (Fig. 516) terminating in an oval spermathecal bulb (Fig. 516). Pumping region not clearly evident although a small flange is present at base of spermathecal bulb.

Amnestus pusio (Stål), 1860

(Fig. 517)

External, internal genitalia and spermatheca (Fig. 517) similar to *Amnestus pallidus*. Eighth paratergites not clearly deliminated, spermathecal bulb spherical.

Sehirini

Sehirus cinctus (Palisot de Beauvois), 1805

(Figs. 518, 519)

Wagner (1963) gives a general description of the *Sehirus* type of genitalia using *Tritomegas sexmaculatus* Rambur as an example. Scudder (1959) gives a more complete general description for Sehirinae.

In *Sehirus cinctus*, eighth paratergites (Fig. 518) continuous above the anus, external genitalia otherwise similar to *Tritomegas sexmaculatus*. Internally no sclerotized rami or ring sclerites present, differing in this respect from Scudder's general description for this group.

Spermatheca very similar to that of *Sehirus bicolor* (Linnaeus) figured by Pendergrast (1957). Basally spermatheca wide (Fig. 519) and with numerous annulations apically narrowing and attached

[illegible]

(Fig. 51)

[illegible] (Fig. 51) [illegible]

[illegible]

[illegible]

(Fig. [illegible])

Wagner (1955) gives a general description of the [illegible] type of apothecia [illegible] [illegible]. [illegible] gives a [illegible]

[illegible]

In [illegible] [illegible] (Fig. [illegible]) [illegible] otherwise similar to [illegible] [illegible] [illegible] [illegible]

[illegible]

to a large spermathecal bulb (Fig. 519); pumping region (Fig. 519) part of basal portion of spermathecal bulb, clearly marked by proximal and distal flanges (Fig. 519).

6. DISCUSSION

6.1 Male genitalia

The major work dealing with the male genitalia of North American pentatomids is that of Baker (1931). However he dealt with Canadian species of Pentatominae and Asopinae only. Recently, Lattin (1964) has dealt with the male genitalia of all North American Scutellerinae and thereby filled a large gap in our knowledge. Pruthi (1925) worked with the world Hemiptera; his findings are of limited value in some taxa, because only a very small number of species was examined. This gave an inaccurate view of some groups. Several other workers have dealt with the male genitalia of various families within the Pentatomoidea. Their work is limited by the small number of species examined. These papers have been considered in the present study wherever relevant.

PENTATOMIDAE

SCUTELLERINAE

The male genitalia amongst species of North American scutellerines are very varied and difficult to assess (Table 1). *Augocoris gomesii* has very clear cut characters, possessing a convoluted thickened duct, hook-shaped claspers, sclerotized

S-shaped third conjunctival appendages and a short stout endophallic duct and is typical of other members of the Scutellerini and subtribe Scutelleraria (Leston, 1952). This species also shows very great similarity to Australian members of this tribe in the structure of its aedoeagus (McDonald, 1961, 1963) and vesica (Kumar, 1964).

The tribe Eurygastrini, as constituted by Leston (1952), included three subtribes: Eurygastraria, Odontoscelaria and Odontotarsaria. Lattin (1964) has separated the Eurygastraria from the rest of this group on the basis of the male genitalia and accorded it tribal status.

The European species of Eurygastrini, possess very uniform characters, Wagner (1963), Vidal (1949) and Piotrowski (1950). The members of this tribe have the following features in common: T- shaped claspers, two to three pairs of heavily sclerotized horn-like conjunctival appendages and a cylindrical membraneous vesica. Unfortunately, details of the internal structure of the vesica have not been considered by other workers in this field so far. The internal details of the vesica of <u>Eurygaster alternatus</u> are definitely pentatomid in construction (Fig. 26) and do not resemble the type found in Scutelleraria. The ejaculatory reservoir is simple

and is connected directly via an anterior sinus to the seminal duct and ejaculatory duct.

The remaining members of the tribe Eurygastrini are now included in the Odontoscelini. The male genitalia of the four North American species show remarkably little similarity to one another with the exception of *Euptychodera corrugata* and *Fokkeria producta*. This relationship can be seen in Figure 520, which is an analysis of eleven character differences found in males and females based on the method of James (1953). Three species all possess stout spiny conjunctival appendages; the vesica of *Homaemus aeneifrons* is, however, quite different from the other two.

The tribe Pachycorini is represented in North America by ten genera, of remarkable uniform character. They have two patches of fine striae on abdominal sterna four to six, one on each side of the mid-line. Only two other genera so far recorded outside of the New World possess this character: *Hotea* and *Deroplax* (Leston, 1952) and possibly *Tectocoris* (Lattin, 1964), although in the latter genus only the females possess the striae. *Hotea* and *Deroplax* are central African in distribution while *Tectocoris* is an Australian genus.

The male genitalia of this tribe show a remarkable array of different types of structure. The

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[illegible]

The male genitalia of [illegible]

[illegible]

[illegible]

The male genitalia of this tribe [illegible]

[illegible]

analysis of character differences mentioned above (Fig. 520) shows that the species in this group are very variable. *Homaemus aeneifrons* has been discussed above under Odontotarsini. The remainder of species show two trends as far as the structure of the vesica is concerned. The majority have either no ejaculatory reservoir or a very small one and this is true also for the Australian species *Tectocoris diopthalmus* (McDonald, 1961) which is quite aberrant in possessing a very small tube-like ejaculatory reservoir. The second group generally has a large S-shaped ejaculatory reservoir and in *Stethaulax marmoratus* and *Camirus moestus* a convoluted duct is present typical of the Scutellerini. The conjunctival appendages vary in number from one to three, however the third when present is never heavily sclerotized and S-shaped as in the Scutelleraria. Claspers are with the exception of *Symphylus carribeanus* hook-shaped, in the latter species they are T-shaped.

PENTATOMINAE

As stated in the introduction both Baker (1931) and Pruthi (1925) have dealt with this subfamily in some detail. In the tribe Pentatomini, containing the vast majority of the species in North America,

five species were found to possess an enormously lengthened endophallic duct which is coiled upon itself like a watch spring. This type of genitalia was described by Baker (1931) but not commented on. The other group containing all other species studied has a relatively short endophallic duct. The species included in each group are shown in table 2.

All species possessing elongate coiled endophallic ducts have several characters in common. All have a pair of dorsal thecal processes (titillators of Baker, 1931), one or two membraneous conjunctival appendages and a pair of heavily sclerotized median penal lobes fused into a flat circular structure with a dorsal median groove. The ejaculatory reservoir is heavily sclerotized, consisting of two chambers divided by means of an internal septum and with the exception of *Euschistus tristigmus* bear a number of transverse striae on the sides.

The other group of species does not present such a uniform picture. Claspers vary greatly and have many forms. Five species were found to have a thecal shield (an asopine character) and of these, *Loxa flavicollis*, has such peculiarly constructed claspers (Fig. 226) and aedoeagus (Fig. 228) that its inclusion in this tribe is suspect. The remaining four species all possess one pair of membraneous conjunctival appendages, a pair of

median penal lobes and a simple sac-like ejaculatory reservoir with a posterior canal, all characters possessed by the Asopinae. However, none of these species have genital plates.

Carpocoris remotus, Dendrocoris humeralis, and Pentatoma rufipes all have genital plates, one pair of membraneous conjunctival appendages and a simple ejaculatory duct. However, all lacked a thecal shield. Both these groups thus connect the asopines very closely to the Pentatomini.

The other species examined in this grouping generally had one or two conjunctival appendages varying greatly in their shape and construction. The ejaculatory reservoir is simple in construction, generally with the seminal duct opening into a posterior canal. The endophallic duct varies greatly in its length and shape. Median penal lobes are present in most species but are absent in five species (see Table 2).

Piotrowski (1950), Kumar (1962) and Pruthi (1925) have all described and figured the male genitalia of Pentatominae. All show the same general variation in pattern in the structure of the aedoeagus; the vesica is generally not figured. Kumar (1964) has figured the vesica separately of eight species of Pentatomines, their structure agrees closely with those found here in North America, one species,

Nezara viridula occurring both in Australia and North America. Leston (1952) states that the genitalia of _Deroplax circumducta_ (Scutellerinae) are like the typical Pentatomid genitalia in possessing a long thin vesica surrounded by the conjunctiva. This is not correct since the typical Pentatomid type possesses a short stout vesica shown by the type of the family _Pentatoma rufipes_ and only one genus so far examined, _Trichopepla semivittata_, has anything like an elongate, thin vesica. So far the only genera possessing the extraordinary elongated coiled endophallic duct are in North America. No worker other than Baker (1931) has reported this type of genitalia from species in other continents.

Investigation of the remaining tribes within the Pentatominae are limited to single species, and comments on these are therefore rather speculative. The genitalia of the two species of _Brochymena_ examined are so similar to those found generally among the Pentatomini that the validity of the Halyini is suspect.

The genitalia of the genus _Mecidea_ were studied in detail by Sailer (1952). The aedoeagus is very similar to that found among the Pentatomini and is remarkably constant for the group in possessing two pairs of bag-like membraneous conjunctival

appendages and a pair of median penal lobes. The vesica is very simple in construction and resembles the general pattern found among the majority of Pentatomini. Once again on the basis of genitalia the elevation of this genus to tribal level is unwarranted.

The remaining tribes, Edessini, Discocephelini and Sciocorini all show certain characteristics peculiar to the species studied. Until more work has been done, little can be said on the status of these tribes except that they all share characters in common with the Pentatomini.

ASOPINAE

Baker (1931) described the Canadian species of this subfamily. On examination of the male genitalia, the similarity shown by all genera in this group is remarkably constant. The following characters are common to all the species examined by myself and to those described in the literature.

1. Pygophore with a pair of genital plates on the dorsal margin, one on each side.
2. Theca with apical margin developed into a thecal shield.
3. Conjunctival appendages variable in number but always membraneous.

4. Median penal lobes present and enclose the apex of the vesica.
5. Ejaculatory reservoir simple with seminal duct entering into a posterior canal. Endophallic duct and seminal duct enter reservoir adjacent to one another.

The Asopinae are differentiated on minor character differences externally but can now on the basis of the male genitalia be very clearly defined. The general structure of the male genitalia is similar to that found in the Pentatomini discussed above.

Leston (1954a) describes and figures the genitalia of _Africus_ _figuratus_ a species from Africa which also clearly possesses the characters set out above. The genital plates are termed dorsal processes by Leston. The status of the Asopinae will be discussed below.

PODOPINAE

The North American species were revised by Barber and Sailer (1953). The aedoeagus of four species is figured, but the internal structure of the vesica was not dealt with. The genitalia of this subfamily are rather uniform; the following characters were found to be common to all species so far examined.

1. Lateral margins of pygophore with a pair of flaps, pygophoral appendages.
2. Theca with a thecal shield.
3. One pair of membraneous conjunctival appendages.
4. A pair of median penal lobes.
5. Ejaculatory reservoir simple, with a posterior canal.

Leston (1953a) described the genitalia of Podops inuncta (Fabricius) and they fit the general pattern found among North American species. The Podopinae are very closely related to the Asopinae, the former subfamily lacking genital plates. Their place seems to have been taken by the pygophoral appendages.

The Podopinae like the Asopinae are thought to be closely related to the Pentatominae. Leston (1953a) noted this when he raised this group to subfamily status.

TESSARATOMIDAE

Leston (1954c, 1954d, 1957) and Pruthi (1925) have both dealt with the male genitalia of this family. Only one species Piezosternum subulatum, was described in the present work. The genitalia of this species and of Piezosternum calidum (Fabricius) (Leston 1954c), an African species, are very similar. Both species possess very long

and highly convoluted endophallic ducts (the vesica does not appear to be fully expanded in Leston's diagram), and one pair of heavily sclerotized conjunctival appendages. *Elizabetha courteauxi* Schouteden (Leston, 1954c) also possesses a very long endophallic duct as does *Phyllocoris acuta* Jeannel. However *Musgravea salciventris* (Stål) and *Rhoecorcoris australasiae* (Westwood), both Australian species, do not have elongate endophallic ducts (Leston, 1957). Kumar (1964) studied the vesica of four Australian tessaratomids. None possess the elongate endophallic duct of *Piezosternum subulatum*; all, however, including *Piezosternum*, have a complicated series of canals within the ejaculatory reservoir (conducting chamber of Kumar). It would appear on the basis of the male genitalia that the subfamily Oncomerinae should be split into two or more subfamilies. Leston (1955) suggested that *Piezosternum* might have to be removed from the Oncomerinae.

Leston (1954d) described the genitalia of *Tessaratoma papillosa* (Drury). These agree closely with *Tessaratoma* sp. figured by Pruthi (1925). The endophallic duct is short and two pairs of membraneous conjunctival appendages are present, relating this tessaratomine to the Australian species of Oncomerinae.

Other species figured and described by Pruthi (1925) from the Eustheninae show close similarities to the Tessaratominae but not to *Piezosternum*.

ACANTHOSOMIDAE

Very little work has been done on the male genitalia. Leston (1953b) describes and figures *Cyphostethus tristriatus* (Fabricius) and *Elasmostethus interstinctus* (Linnaeus). Only two species were examined in the present work, *Meadorus lateralis* and *Elasmostethus cruciatus*. All species with the exception of *Meadorus* have a peculiar dorsal diverticulum on the theca and all have at least one pair of flattened sclerotized conjunctival appendages. However *Cyphostethus* and *Meadorus* have elongate whip-like endophallic ducts whereas both species of *Elasmostethus* tend to have rather apically diffuse endophallic ducts. The ejaculatory reservoir in both species examined by me were pentatomid in construction, being simple sacs with a dorsal canal, the endophallic duct passing out apically. Leston did not, unfortunately, examine the internal structure of the vesica of the two specimens he describes.

CYDNIDAE

A very extensive study was made on the European species of this group by Wagner (1963). The present study is rather cursory and will indicate certain trends among species of the North American fauna. Wagner did not consider the vesica of the species he studied, so no comparisons of this structure can be made. Table 3 gives a summary of characters for the species studied.

CORIMELAENINAE

The pygophore of *Corimelaena pulicaria*, the only species of this subfamily examined, resembles that described by Wagner (1963) for *Corimelaena scarabaeoides*. The aedoeagus of this latter species differs from that of C. *pulicaria* in possessing only two pairs of heavily sclerotized horn-like conjunctival appendages (Wagner's spicula). Three pairs of conjunctival appendages were found in C. *pulicaria* (Fig. 386) and were quite different in shape from those of C. *scarabaeoides*. McAttee and Malloch (1933) figured the aedoeagus of twelve corimelaenines. All possessed two to three pairs of stout sclerotized appendages, five possessed the wing-like appendages on the margin of the theca.

CYDNINAE

Wagner (1963) recognises two major types of genitalia in this subfamily, the *Geotomus* type and the *Sehirus* type. One species only, *Sehirus cinctus*, of the tribe Sehirini exists in North America. On examination, the male genitalia of this species proved to be quite different from any of the genitalia described by Wagner for species in this tribe. The European species all possessed at least one pair of heavily sclerotized conjunctival appendages, generally rod-like. The claspers show striking similarity being somewhat Y-shaped. *Sehirus cinctus* has only one pair of membraneous conjunctival appendages (Fig. 389) and the claspers are large and sickle-shaped. I note here that the vesicae of *Sehirus cinctus* and *Corimelaena pulicaria* are both very similar.

Froeschner (1960) recognised *Amnestus* as a separate subfamily. One species, *Amnestus pallidus*, Zimmer was examined. The male genitalia do not show any striking divergence from other members of the Cydninae. The vesica is unusual in possessing a very long canal into which the seminal duct opens apically (Fig. 410); the canal passes back into the ejaculatory reservoir.

Wagner's (1963) *Geotomus* type genitalia is

characterized by the possession of two pairs of conjunctival appendages, and a moderately long endophallic duct, although he notes that the genus *Cydnus* is aberrant. The three species of North American Cydnini studied show great variation in the construction of aedoeagus and vesica. The number of conjunctival appendages varied from one pair in *Cyrtomenus* (Fig. 400) to three in *Melanaethus* (Fig. 403). The vesica of *Pangaeus aethiops* is very similar to that found in the Scutellerini, in possessing a long convoluted duct. *Aethius inducus* and *Geotomus apicalis* (described by Kumar, 1960) have an infra-vesicular process also found in *Cyrtomenus crassus* (Fig. 401). The structure of the ejaculatory reservoir and associated ducts is very similar both in *Geotomus apicalis* and *Cyrtomenus crassus*. *Aethius indicus* was shown to have three pairs of conjunctival appendages (Kumar, 1960) and a convoluted duct, characters shared in common with *Pangaeus aethiops*. However, the latter species lacks the infra-vesicular process. Wagner (1963) figures an extremely long coiled endophallic duct for *Chilocoris* sps. and *Cydnus aterrimus* Forst. In the latter species the duct is coiled at the base of the theca. This condition was not observed in any of the North American species examined. It is

unfortunate that Wagner (1963) did not deal with the structure of the ejaculatory reservoir. From his work it would appear that the Sehirini, except for the North American species, is a good grouping and resemble the Eurygastrini (Scutellerinae) in the structure of their aedoeagus. Leston (1954b) describes the genitalia of *Sehirus bicolor* and in another paper Leston (1956) describes two species of *Dismegestus*. All these species possess three pairs of conjunctival appendages, the third lightly sclerotized and an endophallic duct projecting well beyond the margin of the theca. Wagner (1963) apparently only found two conjunctival appendages (spicula) in members of this tribe. It is clear that further work is required on species included in this tribe. *Sehirus cinctus* (Fig. 389) has only one pair of membraneous bifid appendages and a very short vesica not projecting beyond the margin of the theca and does not resemble in any way the aedoeagus of *Sehirus bicolor*. It would appear that on the basis of the male genitalia *Sehirus cinctus* is wrongly placed with the Old World species.

6.2. Female genitalia.

The female genitalia present a remarkably uniform picture throughout this superfamily.

Scudder (1959) made a detailed study of the female genitalia of Hteroptera and Pendergrast (1957) of the spermathecae. Dupuis (1955) deals with the morphology of the genitalia in very general terms. Several other workers have dealt with various genera and families within the Pentatomoidea, their work has been incorporated where relevant.

PENTATOMIDAE

SCUTELLERINAE

Odontoscelini

The external genitalia are very uniform in this group. The spermathecal bulbs of the four species placed in this tribe tend to be elongate. One species, Phimodera binotata, possesses a spermathecal diverticulum and lacked the sclerotized canal running from the spermathecal entrance in the base of the genital chamber, found in the remaining three species. The female genitalia and spermathecae are very similar to those of the Pachycorini.

Eurygastrini

Eurygaster alternatus is well placed in a tribe of its own since it possesses sclerotized and interlocking rami, a character found only among members of the tribe Scutellerini so far. However,

the spermatheca is much more similar to species in the Odontotarsini and Pachycorini because it lacks the sclerotized spermathecal dilation and heavily sclerotized spermathecal bulb of the Scutellerini.

Pachycorini

All species examined in this tribe possessed a sclerotized groove or sclerite running along the genital chamber from the spermathecal entrance. The spermatheca itself varied somewhat. All but two species had either a spermathecal diverticulum or a dilation. The spermathecal diverticulum was membraneous and sac-like and was either attached mid-way to the spermathecal duct by means of a branch duct (*Stethaulax marmoratus*, Fig. 441) or was entirely separate (*Acantholomidea porosa*, Fig. 434). The spermathecal dilation was generally membraneous but was tough and sclerotized in *Diolcus irroratus* (Fig. 424). *Chelysomidea guttata* is very unusual in possessing only one pair, (the outer) of sclerotized rami suggesting a relationship with the Scutellerini. However, its spermatheca is much more typical of the Pachycorini in possessing a weakly defined pumping region, and elongate sausage-like spermathecal bulb (Fig. 438).

Scutellerini

Augocoris gomesii was the only North American species studied. Pendergrast (1957) studied five species of scutellerines. The spermatheca is characterized in this group by the development of a very tough sclerotized globose spermathecal diverticulum and a well defined pumping region with proximal and distal flanges. This type of spermatheca is typical for this tribe only.

PENTATOMINAE

Pentatomini

As pointed out in the introductory remarks, the genitalia and spermathecae of this subfamily are remarkably homogeneous. The presence or absence of spiracles on the eighth paratergites appears to be a random character of specific value only. However, a very distinct character was noted in nine species, among these, the spermathecal bulb had a series of hollow horn-like projections varying in number from two to four. The significance of these structures is unknown. This character does not occur in any of the species possessing an elongate endophallic duct and hence does not reinforce in any way the division into two groups found among the males of the North American

genera (Table 5).

Other characters included ring sclerites, found otherwise in only two European species *Pentatoma rufipes* and *Eysarcoris aeneus*. It would be interesting to know if this was common to all palaearctic genera, however, little work has been done at this level on the palaearctic fauna. Scudder (1959) notes that ring sclerites may be present, also a tendency for the development of additional sclerotizations around the opening of the spermathecal duct. Most species examined in the present study possessed one or two small sclerites around the spermathecal opening.

Thyanta perditor was slightly unusual in possessing an elongate spermathecal bulb (Fig. 479) with a peculiar pumping region but was otherwise normal. The most aberrant species examined was *Trichopepla semivittata* in which the spermatheca was a simple sac resembling that of the Cryptostemmatidae. However further work will have to be done on this genus to elucidate its homologies.

Halyini, Edessini, Discocephalini
Sciocorini, Mecidiini

Specimens examined from all these tribes all proved to have genitalia similar to those of the

Pentatomini. Brochymena (Halyini) and Edessa (Edessini) had processes on the spermathecal bulb.

ASOPINAE

The female genitalia and spermathecae of species in this subfamily are very similar to those of the Pentatominae, a fact noted by Pendergrast (1957). The female genitalia and spermatheca show a remarkable uniformity throughout the group, paralleling that found in the male genitalia. Based on the female genitalia and spermatheca the Asopinae are very closely related to the Pentatominae.

PODOPINAE

Genitalia and spermatheca are similar to those of the Pentatominae and the spermathecal bulb had two to three processes. This subfamily, as in the case of the Asopinae, is very closely related to the Pentatominae on the basis of the spermatheca and female genitalia.

ACANTHOSOMIDAE

The genitalia of the two species examined were like those of the Pentatominae externally; internally, sclerotized rami were present, agreeing with Scudder's (1959) general description. The

spermatheca has no diverticulum, differing in this respect from the general Pentatomid type. Acanthosoma haemorrhoidale (Linnaeus) figured by Pendergrast (1957) also lacked a spermathecal diverticulum.

Unfortunately very few acanthosomids have been studied so far. A total of four genera and six species of the world's fauna have been described including the two species in this paper. On the basis of the female genitalia, the Acanthosomidae appear to be distinct from the Pentatomidae in possessing sclerotized rami and in the form of the spermatheca. More work needs to be done on this family before a definative statement can be made about its relationships. The status of this family is considered below.

TESSARATOMIDAE

Pendergrast (1957) figures the spermatheca of four species of tessaratomids, Kumar (1962) describes and figures the genitalia of four species and the spermatheca of one; Scudder (1959) examined three species. Sclerotized and interlocking rami were found in Piezosternum subulatum, consistent with Scudder's description. Kumar (1962) noted that in two species of Oncomerini the rami were absent, but were present in Stilidia sp. The

spermatheca of *Lyromorpha rosea* (Westwood) is very similar (Kumar, 1962) to that found in the Pachycorini (Scutellerinae) as is the spermatheca of *Musgravea sulciventris* (Pendergrast, 1957). The spermatheca of *Piezosternum subulatum* does not resemble that of *Musgravea* very greatly, consisting of a wide long spermathecal duct terminating in a pumping region and bulb (Fig. 502). This tends to reinforce the observation made in the discussion of the male genitalia that the subfamily Oncomerinae is taxonomically heterogeneous. Other species described all show great similarity to one another (Pendergrast 1957). They have in common an ovoid spherical spermathecal dilation which is completely lacking in *Piezosternum*.

CYDNIDAE

The major works on Cydnidae (Froeschner, 1960) and Wagner (1963) deal only with the external female genitalia and these give very little clue as to the relationships within this complex group. Scudder (1959) has examined the genitalia of nine species; Pendergrast (1957) has figured the spermatheca of four species; and Kumar (1962) the female genitalia of four species and the spermatheca of two. The present study deals with seven species, intended only to give a general idea of the relation-

ships of the Cydnidae. However, such a diversity of form was discovered especially in the type of spermatheca, that much more work will have to be done to elucidate the systematics of this family. Some tentative ideas are presented, based on this and other work mentioned above.

CORIMELAENINAE

Two species, *Corimelaena pulicaria* and *Galgupha nitiduloides*, were examined. The genitalia were similar in both species agreeing with the general description given by Scudder (1959). The spermathecae differ, however, quite radically. *Corimelaena pulicaria* has a simple spermathecal duct with no diverticulum or dilation, terminating in a pump and spermathecal bulb, resembling very closely the spermatheca of acanthosomids and plataspids. *Galgupha nitiduloides* has a sclerotized groove extending from the entrance of the spermathecal duct in the genital chamber and a large sac-like spermathecal diverticulum resembling very closely the type of spermatheca found in the Pachycorini (Scutellerinae). An identical type of spermatheca was found in *Galgupha ovalis* by Pendergrast (1957). However *Thyreocoris scarabaeoides* (Pendergrast 1957) had a third type

of spermatheca which is similar to the one found in several species of Cydnini (see below). This suggests that the subfamily Corimelaeninae is a composite grouping. Pendergrast (1957) states that further species should be examined to show whether Gulgupha ovalis is aberrant in its type of spermatheca or whether there is diversity of form in this subfamily. Diversity of form does indeed exist and further work needs to be done in this group.

CYDNINAE

Cydnini

Three species were examined and all showed marked similarities. The female genitalia are somewhat more complicated in Dallasiellus discrepans, two series of sclerites being found above the anus, the dorsal-most, probably representing the median section of the eighth paratergites. Sclerotized rami are present in this group, these are not found in the Coremelaeninae. The presence of ring sclerites is variable, Scudder (1959) states that these are absent. Ring sclerites were found in Dallasiellus discrepans and Pangaeus aethiops. The spermatheca is very similar in all forms possessing a small spermathecal dilation within which is a stout sclerotized rod, globular in Cyrtomenus

crassus. The same type of spermatheca was found in the species studied by Pendergrast (1957) and in *Stibaropus callidus* (Kumar 1962). The latter author however found a completely different type of spermatheca in *Geotomus apicalis*. In this species the spermathecal duct is very long and highly coiled and the dilation is lacking. Pendergrast (1957) notes the similarity of the type of spermatheca with a dilation and internal rod to that found in the Pentatomidae. The cydnid dilation is, however, much modified, the whole structure being smaller and stouter than the structure found in the Pentatominae. Wagner (1963) has created a new tribe Geotomini and this division may be further confirmed on the basis of the spermatheca.

Amnestini

Two species were examined and these showed a highly aberrant type of genitalia and spermathecae. Froeschner (1960) describes the peculiar triangular plate which surrounds the anal opening. Its exact homology is difficult to determine but probably represents the fused ninth paratergites and tenth sternum. The spermatheca is unique, consisting of a wide highly coiled spermathecal duct terminating in a spermathecal bulb, no pumping region was

apparent. Adjacent to the spermathecal opening into the vulva is a small sac-like diverticulum.

It would appear that on the basis of the female genitalia and spermatheca, the Amnestini probably deserve at least subfamily status.

Sehirini

The genitalia of Sehirus cinctus do not resemble those of Sehirus bicolor figured by Scudder (1959). Contrary to his general description of this group, sclerotized rami and ring sclerites were not found in Sehirus cinctus. The spermatheca of S. bicolor, (Pendergrast, 1957) is not the same as that of S. cinctus, the latter species possesses a basal dilation connected by a short duct to the pump and bulb (Fig. 519). The dilation does not appear to have the sclerotized rod found in the Cydnini. The position of Sehirus cinctus is doubtful and is discussed below.

6.3. Interrelationships and classification of the Pentatomoidea

6.31 Phylogeny and Relationships of the Pentatomoidea

A great deal of work has been done on the systematics of the Heteroptera of which the

Pentatomoidea are a part. However, I feel that too much emphasis has been laid on results obtained from a very small number of species examined in the various families. It became clear after detailed examination of the North American Pentatomoidea that great variation of structure occurs in all families and workers choosing but a few random species to work on would get and did get quite an erroneous impression of the group as a whole. This is particularly so among the Scutellerinae where the only work previously done was by Leston (1952) on the tribe Pachycorini. The results proved to be quite startlingly different from those obtained by other workers examining species only from the Scutellerini.

Pruthi (1925), Pendergrast (1957), Scudder (1959), Leston (1958), Manna (1958), and Miyamoto (1961), have dealt with the classification of the Pentatomoidea from various points of view. Leston et al. (1954) proposed a classification of terrestrial Heteroptera based on a synthesis of all previous morphological work on this group. Its weakness, as China (1955) points out, is in the fact that most of the previous work on the Heteroptera had been rather fragmentary and dealt with rather small samples in the various groups each worker had had under consideration. The present work will help fill in

some gaps in our knowledge, but it cannot be regarded as being complete in any way and any conclusions reached must be regarded with some degree of reserve.

I shall consider first the phylogeny and relationships of the Pentatomoidea. This superfamily together with the Pyrrhocoroidea, Lygaeoidea, Coreoiodea and Aradoidea forms the group Pentatomorpha (Leston et al. 1954). The following features are characteristic for the Pentatomoidea. The males have the ninth segment developed in the pygophore in which are found a pair of claspers and the aedoeagus. The latter consists of a toughened theca, the conjunctiva which generally bears one to three pairs of conjunctival appendages and the vesica. The seminal duct generally enters a sclerotized ejaculatory reservoir, variously modified, and this in turn connects with the endophallic duct, which opens at the secondary gonopore. The female genitalia are of the plate-like type (Scudder, 1959). The presence of ring sclerites and rami is variable. The spermatheca is characterized by a well marked pumping region, generally with proximal and distal flanges, terminating in a spermathecal bulb of variable shape.

The Coreoidea and Pyrrhocoridae are, on the basis of the female genitalia, the closest to the

Pentatomoidea in possessing a plate-like ovipositor (Schaeffer, 1964). The Lygaeoidea, on the other hand, have a laciniate type ovipositor with some exceptions. The male genitalia of the coreid complex are probably the closest to the pentatomoid type in possessing a distinct ejaculatory reservoir and membraneous conjunctival appendages (Scudder, 1957), but the vesica is different in that the endophallic duct in the coreoids is generally very elongate (Pruthi,1925; Scudder, 1957). Piezosternum (Tesseratomidae) has, however, a very highly coiled endophallic duct within the apex of the vesica and if this were extrusible it would produce a very long apical duct. The latter would resemble the very long coiled endophallic ducts found in the Lygaeidae (Aslock, 1957). The remainder of the families in the Pentatomoidea have a relatively short vesica with exception of the few genera in the Pentatominae which have an elongate vesica. The latter group is probably a highly specialized development of the normal pentatomine type.

Miyamoto (1961) found that the coreids showed resemblances to the pentatomoids on the basis of the gastric caeca but that the structure of the salivary gland resembled that of the pyrrhocorids.

The cytogenetics of the pentatomoid group is complex and evidence for relationship with other

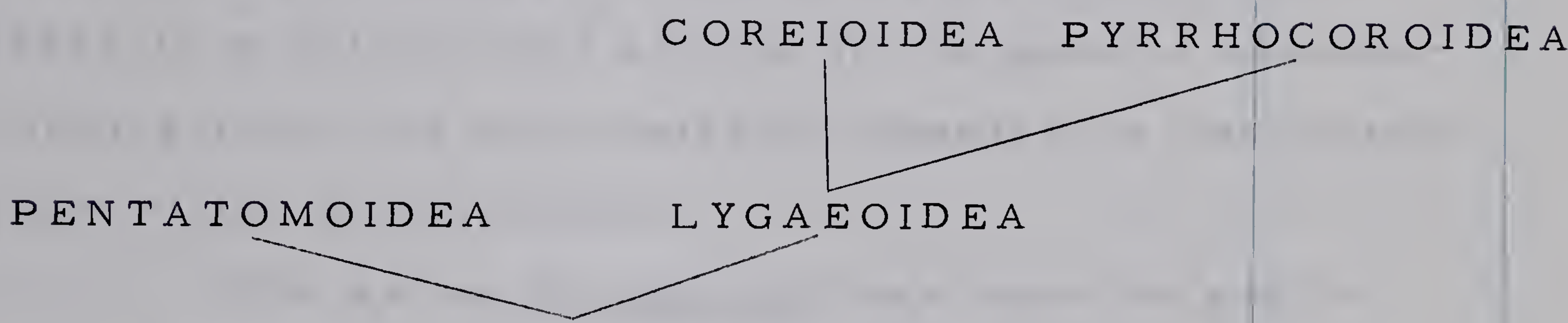
groups is not clear cut. Leston (1958) found two distinct groups within the Pentatomoidea: the Acanthosomidae, Tessaratomidae and Scutelleridae with 2n = 12 chromosomes, and the Pentatomidae with 2n = 14. However, in the latter family chromosome numbers range from 2n = 6 to 2n = 27. Neither the Coreioidea nor the Lygaeoidea show close relationship to the Pentatomoidea cytologically. The coreids have varying chromosome numbers with a mode of 2n = 21. The Lygaeidae on the other hand have also variable chromosome numbers but have a diploid number of 2n = 14. The coreids have a XO sex mechanism, the lygaeids an XY sex mechanism resembling the Pentatomidae. However, the latter family does not possess m-chromosomes found in a great majority of the species of lygaeids.

Manna (1958) derives the Lygaeidae from the Pentatomidae on the basis of cytological evidence. This I doubt on the basis of evidence from the male and female genitalia, the lygaeids generally possessing a primitive laciniate type ovipositor.

Schaeffer (1961), on the basis of a vast amount of data, derived both the Coreioidea and Pyrrhocoroidea from the Lygaeoidea. The Pentatomoidea show some relationship to the above superfamilies but this is not very close. The Pentatomoidea

probably were derived independently of the lygaeoids from some common ancestor, as suggested by China's (1955) diagram of the relationships of the heteropterous families. Leston (1958) and China and Miller (1959), on the other hand proposed independant origins for the Lygaeoidea, Coreioidea and Pentatomoidea from a common ancestor. The evidence obtained so far would tend to indicate that the latter theory was closer to reality.

The relationship of the four groups is shown below.



6.32. Relationships within the Pentatomoidea

Ranking of the Scutellerinae

The status of the Scutellerinae has posed quite a problem in the past. Now that all representative tribes have been examined, I am inclined to agree with Pendergrast (1957) and Kumar (1962), and raise the Scutellerinae to family rank. The group is, however, difficult to define on the basis of the male and female genitalia. The Scutellerini form a distinct group possessing in the

males three pairs of conjunctival appendages, with the third generally heavily sclerotized and S-shaped. The vesica has a long convoluted duct and the endophallic duct is short. The females have paired sclerotized rami and the spermatheca has a heavily sclerotized dilation and a distinct pumping region. The Eurygastrini show characters intermediate between the Scutellerini and Pachycorini. They have sclerotized and interlocking rami in the females. The spermatheca is, however, much simpler, lacks a dilation and flanges in the pumping region but there is a sclerotized groove in the genital chamber running from the spermathecal opening, a characteristic of the Pachycorini.

The genus Eurygaster has been raised to tribal status by Lattin (1964) and this is supported by my own work. However, Wagner (1963) raised this group to family level, and this I think is hardly warranted on the basis of the morphology of the genitalia. The tribe shows very great similarities to the other tribes within the Scutellerinae, especially the Pachycorini. The latter tribe and the Odontotarsini are very similar. Both groups possess elongate sclerotized grooves in the floor of the genital chamber, a feature not found in the Pentatominae. Rami are lacking except in one species Chelysomidea guttata (Pachycorini) in which

only the outer rami are present. The spermatheca has either a simple duct or a membraneous diverticulum attached half way along the spermathecal duct, or separately at the base of the duct (sclerotized in *Diolcus irroratus*). All these types of spermatheca do not resemble in any way the elongate dilation with central rod found in the Pentatominae. More work will have to be done on the Palaearctic species of the Odontoscelini before an adequate definition of this tribe can be made.

Ranking of the Asopinae and Podopinae

The Pentatominae and Podopinae are remarkably constant in genitalic characters. The male and female genitalia of the Asopinae show remarkable similarity to one another and to the Pentatominae. I think on this basis the subfamily should be downgraded and given tribal status within the Pentatominae. The characters possessed in common by all genera in the Asopinae such as the genital plates and thecal shield are also found in species of the Pentatominae (Table 2) but never in combination. The internal structure of the vesica is typically pentatomine and the structure of the spermatheca is identical to that found in that subfamily. The similarity of the Asopinae to the Pentatominae was noted by Leston (1954a).

The Podopinae and Asopinae are very closely related. The Podopinae lack genital plates but have in their place a pair of pygophoral appendages. The structure of the aedoeagus and vesica is identical in both subfamilies. Leston (1953a) raised the podopines to subfamily status but felt that further research might lead to a drop in its rank. On the basis of the work done by Barber and Sailer (1953) and the present study this group should be given tribal status within the subfamily Pentatominae. Pendergrast (1957) states that the Podopinae and Asopinae are so close to the Pentatominae that they should either be lowered in status or that the other subfamilies should be raised in status. I think the former course more desirable because of the very close affinities this group shows to the Pentatominae.

Tribal status in the Pentatominae

Within the Pentatominae the tribes Halyini and Mecidiini on the basis of the male and female genitalia are so similar to the Pentatomini that these two tribes should be given subtribal status or incorporated into the Pentatomini as genera. However, other genera within the Halyini may warrant tribal status. The vesicae of five species of Australian Halyini have been described by Kumar

(1964) and these all resemble the typical plan found among Pentatomini. Ruckes (1946, 1958) who has made a major study of this group, has not described the internal details of the male genitalia. The genitalia of the Mecidiini studied by Sailer (1952) were all remarkably uniform in character and are similar to the Pentatominae.

The Discocephalini have recently been raised to subfamily status by Ruckes (1960, 1963). However, I would hesitate to follow such a step until further work had been done on the male and female genitalia of the species in this tribe. Ruckes (personal communication) informs me that he has several excellent characters which distinguish this tribe from others in the Pentatominae. The male genitalia of *Lineostethus clypeatus* differs but slightly from the typical pentatomid type in having a thickened sclerotized ring at the base of the endophallic duct. The female genitalia are typically pentatomine in construction.

A single species of both the Edessini and Sciocorini was studied. In both cases the female genitalia were typically pentatomine. The male genitalia, however, showed slight differences from the general pattern especially in *Edessa bifida*. More work will have to be done on these groups

before any statement can be made with certainty. It would seem, however, that both these tribes are fairly closely related to the Pentatomini.

Status of the Acanthosomidae

The Acanthosomidae have been accorded family status by Leston (1953b). China (1959) retains the group as a subfamily of the Pentatomidae. On the basis of the male genitalia I agree with China. The acanthosomids are undoubtedly older and less specialized than the pentatomines in many respects. The spermatheca lacks the highly specialized dilation of the pentatomines. Leston (1958) found the chromosome number to be 2n = 12 with a XY sex determining mechanism, characters common to the Scutellerinae. Both Dupuis (1948) and Southwood (1956) consider the Acanthosomidae to be a primitive family.

The Cydnidae

A preliminary study of a few species in this family has revealed a considerable diversity in the structure of the genitalia and the family is one of great interest. Froeschner (1960) was dubious regarding the phylogenetic relationships indicated by the presence of a fringe of close set

bristles on the apices of the middle and posterior coxae, external morphological characters used to distinguish members of this family from other families in the Pentatomoidea. He goes on to question the value of characters used to define groups within the Pentatomoidea as indicators of phylogeny within this superfamily as a whole. From a study of the male and female genitalia it becomes clear that the Cydnidae is a somewhat heterogeneous assemblage. This view was also held by Pendergrast (1957).

Very little can be said regarding the Corimelaeninae at this stage. The male genitalia of Corimelaena pulicaria do not resemble the general pattern found in the Pentatominae, as three pairs of conjunctival appendages were found, and the theca possessed a peculiar pair of thecal appendages; the vesica was simple. The male genitalia of species figured by McAtee and Malloch (1933) appeared to resemble Corimelaena pulicaria in many details. The two spermathecae examined were quite different; one was similar to the acanthosomid type and the other to the Pachycorini (Scutellerinae). The genitalia show very little similarity to those of the Cydninae studied so far. It may be that on further investigation the present recognition of Corimelaeninae as a family by specialists in North America will achieve wider acceptance.

The Cydninae, on the basis of male and female genitalia so far examined show relationship with the Pentatominae. The eggs (Southwood, 1956) show similarity to those of the Pyrrhocoridae and some Lygaeidae. Southwood (1956) stated that the family as a whole was rather ancient and closer to the Tessaratomidae than to the Pentatomidae. The ovariole number (Miyamoto, 1957 and Woodward, 1950) for the majority of species examined was seven which is also the most frequent number found among Pentatominae. Little work has been done on the chromosomes of this subfamily (Leston, 1958; Manna, 1958).

The relationships of the Cydnidae will not be discussed further. I feel at the moment that too little is known about the basic morphology of the species in this family and further research needs to be done on species included in this family.

Phylogenetic considerations

The ancestral pentatomoid probably had very simple male genitalia. The vesica was long, the seminal duct probably entered into a simple sac-like ejaculatory reservoir. Conjunctival appendages, if present, were small and membraneous. The female spermatheca was a simple duct terminating in a

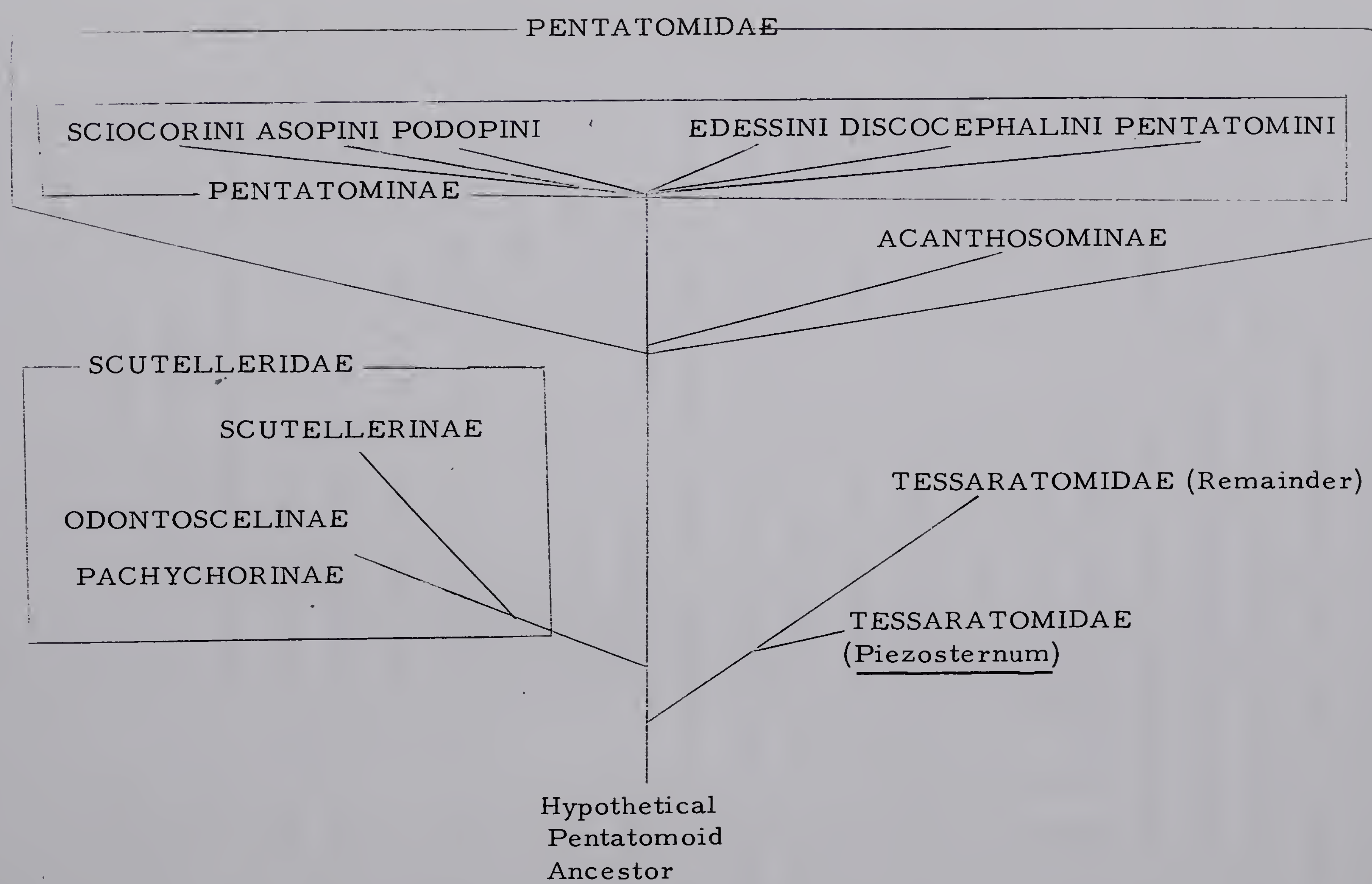
pumping region and spermathecal bulb. The ovipositor was of the plate-shaped type. The Tessaratomidae are probably the most primitive family (Leston, 1954d) with *Piezosternum* being the most primitive genus so far examined in the family. *Piezosternum* both in the structure of the aedoeagus and spermatheca shows definite coreoid affinities and is radically different from other members of this family, e.g. *Musgravea sulciventris*. *Piezosternum* is probably very close to the ancestral pentatomoid which gave rise to the variously modified groups in this superfamily.

The ancestral pentatomoid stock appears to have evolved into two distinct lines, the Scutelleridae and the Pentatomidae. In the Scutelleridae, the male genitalia became slightly more complex with the seminal duct opening into an internal canal within the ejaculatory reservoir. Conjunctival appendages became more complex but were still generally membraneous. The spermatheca was still simple but in some cases possessed a diverticulum or dilation. These characters are typical of Pachycorinae and Odontoscelinae. The Scutellerinae are the most highly evolved and specialized group. The third conjunctival appendages have become sclerotized and S-shaped. The vesica has a specialized convoluted duct and the endophallic duct has become very much shortened.

The females possess interlocking and sclerotized rami, a distinctly non-pentatomine character, and the spermathecal duct has a sclerotized dilation.

Within the Pentatomidae, the Acanthosominae must be considered a very early offshoot of the pentatomid stock but still closely related to the Pentatominae. The females retain the simple type of spermatheca but have developed sclerotized rami in the ovipositor, parallelling the Scutellerinae. The male genitalia, in the structure of the vesica, resemble the Pentatominae closely in that the seminal duct either opens into an internal canal within the ejaculatory reservoir, or directly into the reservoir. The conjunctival appendages tend to be more specialized and are sclerotized. As pointed out previously the Acanthosominae retain the more primitive chromosome number 2n = 12 (Leston, 1958) and very likely represent an early group in the development of the more highly specialized Pentatominae.

The Pentatominae have generally retained a simple vesica with the seminal duct opening into the ejaculatory reservoir via an internal canal. The North American fauna have evolved a small group of very highly specialized species in which the endophallic duct has become enormously lengthened and coiled; the ejaculatory reservoir has a complex series of internal ducts. The Pentatominae have



PHYLOGENETIC DIAGRAM OF THE PROBABLE EVOLUTION

OF THE PENTATOMOIDEA

developed two specialized features, the sclerotized median penal lobes and the dilation with internal rod of the spermatheca. Sclerotized rami have not been developed in this group. The type of spermatheca is quite constant throughout this subfamily with the sole exception of Trichopepla semivittata in which the spermatheca is sac-like. The median penal lobes are not found in all species. The Asopini, Podopini, Edessini, Discocephalini and Sciocorini are all very recent specializations of the main pentatomine stock and retain many characters in common with the latter group. The phylogenetic sequence of the Pentatomoidea excluding the Cydnidae is shown in the diagram opposite.

The paired sclerotized rami found in the female genitalia have apparently evolved independently three times, in the Tessaratomidae (Piezosternum), the Scutellerinae and the Acanthosominae. Spermathecal dilations have evolved twice. The Pentatominae have developed the specialized membraneous dilation with internal rod and the Scutellerinae a heavily sclerotized and less specialized dilation. In the male genitalia specialized structures have evolved in great profusion in each group. Median penal lobes have apparently evolved in two groups, the

Pentatominae and in the Scutelleridae where they are found in a single species Symphylus carribeanus. The conjunctival appendages are subject to great change and have become variously modified in each subfamily.

6.4. Proposed Classification of Families and Subfamilies of North American Pentatomoidea

(a) SCUTELLERIDAE
  1. Odontoscelinae
  2. Eurygastrinae
  3. Pachycorinae
  4. Scutellerinae

(b) PENTATOMIDAE
  1. Pentatominae
    1.1 Pentatomini
    1.2 Edessini
    1.3 Discocephalini
    1.4 Sciocorini
    1.5 Asopini
    1.6 Podopini
  2. Acanthosominae

(c) CYDNIDAE
  1. Corimelaeninae
  2. Cydninae
    2.1 Cydnini
    2.2 Amnestini
    2.3 Sehirini

(d) TESSARATOMIDAE
  1. Piezosterninae

6.5. Keys

Key to Families and Subfamilies of North American Pentatomoidea Based on Male Genitalia

1. Endophallic duct very fine and long, highly convoluted within vesica (Fig. 371) ---------------------------- TESSARATOMIDAE

   Endophallic duct otherwise------------------2

2. Median penal lobes present, always rounded apically -------------------------PENTATOMIDAE PENTATOMINAE

   Median penal lobes absent (present in *Symphylus carribeanus*), apex serrate-----------3

3. Claspers distinctly hook-like (Fig. 5) or scythe-shaped (Fig. 53)---------SCUTELLERIDAE

   Claspers not hook-like or scythe shaped-----4

4. Claspers tube or rod-like (Fig. 384 ---------5

   Claspers other shapes---------------------- 6

5. Theca with a pair of wing-like thecal appendages (Fig. 385); ejaculatory reservoir simple ---------------------------------CYDNIDAE

   CORIMELAENINAE

   Corimelaena pulicaria

   Theca without appendages; ejaculatory reservoir with posterior canal (Fig. 89) ------------------------------PENTATOMIDAE

   PENTATOMINAE

6. One pair of membraneous conjunctival appendages only, or absent altogether ------------------------------ PENTATOMIDAE PENTATOMINAE

Two to three pairs of conjunctival appendages -- 7

7. Claspers either bifid (Fig. 19) or T-shaped (Fig. 24)---------------------- SCUTELLERIDAE

Claspers generally flattened, never bifid or T-shaped------------------------------------- 8

8. Ejaculatory reservoir complex generally with internal duct; if simple then endophallic duct short ---------------------------- CYDNIDAE CYDNINAE

Ejaculatory duct simple with or without posterior canal; endophallic duct either whip-like (Fig. 375) or long and apically diffuse (Fig. 382)--------------------- PENTATOMIDAE ACANTHOSOMINAE

Key to Genera of North American Scutelleridae Based on Male Genitalia

1. Vesica with long convoluted duct, extending from anterior end into ejaculatory reservoir (Fig. 30)-- 2

   Vesica without such duct---------------------- 4

2. Endophallic duct with a broad oblong dorsal sheath (Fig. 30); conjunctival appendages membraneous --------------------------------- *Camirus* Stål, 1862

   Endophallic duct without sheath; at least one pair of conjunctival appendages, heavily sclerotized apically---3

3. Ejaculatory reservoir globose (Fig. 61); apex of vesica flattened------ *Stethaulax* Bergroth, 1891

   Ejaculatory reservoir elongate (Fig. 83); apex of vesica tubular----- *Augocoris* Burmeister, 1835

4. Three pairs of sclerotized horn-like conjunctival appendages; theca with cylindrical ventral process (Fig. 25)---------------- *Eurygaster* Laporte, 1832

   Never with combination of all characters above---5

5. Ejaculatory reservoir either simple, sac-like, composed of a single chamber, or absent---------6

   Ejaculatory reservoir complex; if apparently simple, large spiny third conjunctival appendages present (Fig. 11), or apex of vesica with spiny processes one on either side (Fig. 17)-----------11

6. Ejaculatory reservoir absent; seminal duct opening directly into endophallic duct (Fig. 36)------ 7

   Ejaculatory reservoir present as a small

diverticulum (Fig. 56)------------------------------ 8

7. Pygophore with dorsal margin produced into an elongate process (Fig. 32); endophallic duct very short, not projecting beyond margin of theca --------------------Pachycoris Burmeister, 1835

Pygophore with smooth dorsal margin; vesica with complex pumping apparatus (Fig. 72); endophallic duct projecting well beyond margin of theca --------------------Diolcus Mayr, 1864

8. Apex of vesica covered with a number of stout spines and with a stout spiny dorsal process (Fig. 55)----------------Sphyrochoris Mayr, 1864

Vesica without spines----------------------- 9

9. Three pairs of conjunctival appendages present, third spiny; apex of vesica very broad covered with spines, basally with a number of partitions giving a coiled appearance (Fig. 46) -------------------------Homaemus Dallas, 1851

Only two pairs of conjunctival appendages present-------------------------------------- 10

10. Dorsal margin of proctiger produced into a number of spiny processes (Fig. 37); apex of vesica membraneous----Chelysomidea Lattin, 1965

Dorsal margin of pygophore smoothly arched; apex of vesica sclerotized -------------------------Tetyra Fabricius, 1803

11. Third conjunctival appendages present, broad and spiny (Fig. 11)------------------------------ 12

Third conjunctival appendages absent------ 13

12. Second conjunctival appendages bifid, bearing two sclerotized horns (Fig. 6) ----------------------*Fokkeria* Schouteden, 1904

Second conjunctival appendages bearing a large single horn-----*Euptychodera* Bergroth, 1908

13. Vesica with a pair of spiny lobes, one on each side near apex (Fig. 17) -------------------*Vanduzeeina* Schouteden, 1904

Vesica without such lobes------------------14

14. Endophallic duct basally with a very short convoluted section (Fig. 22); only one pair of membraneous conjunctival appendages present. ---------------------- *Phimodera* Germar, 1839

Endophallic duct without convolutions; two pairs of conjunctival appendages present--------15

15. Apex of vesica very short projecting slightly beyond margin of theca (Fig. 77); claspers broadly hook-shaped --------------------*Acantholomidea* Sailer, 1962

Apex of vesica long enclosed between median penal lobes (Fig. 65); claspers T-shaped -------------------------*Symphylus* Dallas, 1851

Key to the Tribes of North American Pentatominae Based on Male Genitalia

1. Endophallic duct basally with stout sclerotized ring (Fig. 278) ------------------- Discocephalini

Endophallic duct without such ring----------2

2. Dorsal border of pygophore bearing a stout peg-like genital plate (Fig. 269), one on each side; ejaculatory reservoir elongate and with a number of internal ducts (Fig. 272). Theca without thecal shield ------------------- Edessini

Dorsal border without genital plates or if present, flattened and plate-like; theca with or without thecal shield---------------------------3

3. First conjunctival appendages covered with stout spines, second apically with sclerotized rings (Fig. 281). ------------------- Sciocorini

First conjunctival appendages not spiny------4

4. Pygophore with genital plates on dorsal border (Fig. 287); theca with thecal shield (Fig. 290); ejaculatory reservoir with posterior canal (Fig. 292) ---------------------- Asopini

Combination of characters not as above----- 5

5. Pygophore with stout pygophoral appendages one on each side on lateral margin (Fig. 356) -------------------------------------- Podopini

Pygophore without such appendages ---------------------------------------Pentatomini

Key to Genera of North American Pentatomini Based on Male Genitalia

1. Endophallic duct very long coiled (Fig. 236) dorsal margin of theca with thecal processes (Fig. 234) ejaculatory reservoir complex (Fig. 236) -- 2

Endophallic duct short, theca with or without dorsal processes; ejaculatory reservoir generally simple with posterior canal (Fig. 89)----------- 6

2. Ejaculatory reservoir moderately sclerotized, not possessing a number of lateral striae (Fig. 250)---------------------<u>Euschistus</u> Dallas, 1851

Ejaculatory reservoir very heavily sclerotized with a number of well marked striae laterally--- 3

3. Two distinct pairs of membraneous conjunctival appendages, second with five lobes (Fig. 233) --------------------------- <u>Menecles</u> Stål, 1867

One pair of conjunctival appendages generally only shallowly divided--------------------------- 4

4. Thecal processes with a distinct projection between them from margin of theca, conjunctival appendages elongate distinctly bifid (Fig. 239) ---------------------------<u>Coenus</u> Dallas, 1851

Combination of characters not as above, conjunctival appendages if bifid, broadly so-----5

5. Ventral border of pygophore with a deep median U-shaped emargination (Fig. 241) conjunctival appendages broad undivided (Fig. 243) ------------Hymenarcys Amyot and Serville, 1843

Ventral border without emargination, conjunctival appendages broadly bifid (Fig. 253) -------------------------Prionosoma Uhler, 1863

6. Conjunctival appendages absent--------------- 7

Conjunctival appendages present------------ 8

7. Theca shield-like, within which is a further sheath-like structure (Fig. 228) claspers very complex (Fig. 226) --------------------Loxa Amyot and Serville, 1843

Theca not as above, claspers trilobed (Fig. 146)---------------- Chlorocoris Spinola, 1837

8. Thecal shield present (Fig. 183)------------ 9

Thecal shield absent------------------------- 11

9. Seminal duct extended into dorsal canal, ejaculatory reservoir simple--------------------- 10

Seminal duct extended into base of endophallic duct; ejaculatory reservoir divided (Fig. 185) -------------------------- Murgantia Stål, 1862

10. Apex of vesica projecting well beyond the margins of the median penal lobes, not enclosed by them (Fig. 108) -----------------Peribalus Mulsant and Rey, 1866

Apex of vesica not or only slightly projecting beyond margins of median penal lobes which otherwise enclose apex------------------------------------ 11

11. Conjunctival lobe present, very large (Fig. 179); ventral surface of pygophore vertical (Fig. 177) -------------------------*Neotiglossa* Kirby, 1837

Conjunctival lobe small (Fig. 131), ventral surface of pygophore horizontal -------------------------*Aelia* Fabricius, 1803

12. Genital plates present------------------------13

Genital plates absent--------------------------14

13. Ejaculatory reservoir simple, with posterior canal; vesica S-shaped (Fig. 154) ---------------------- *Carpocoris* Kolenati, 1846

Ejaculatory reservoir with internal duct, vesica short----------- *Dendrocoris* Bergroth, 1891

14. Median penal lobes absent------------------ 15

Median penal lobes present (Fig. 170)------- 18

15. Ejaculatory reservoir without posterior canal (Fig. 114)------------*Trichopepla* Stål, 1867

Ejaculatory reservoir with posterior canal (Fig. 123)------------------------------- 16

16. Conjunctival appendages divided into three distinct broad lobes (Fig. 122). Endophallic duct short, curved (Fig. 23) --------------------*Brepholoxa* Van Duzee, 1904

Conjunctival appendages elongate; endophallic duct S-shaped (Fig. 196)-------------------- 17

17. Theca with a small pair of projections one on each side, near base (Fig. 199). Second conjunctival appendages present.
------------------------- Cosmopepla Stål, 1867

Theca without projection; second conjunctival appendage absent (Fig. 194)--Eysarcoris Hahn, 1834

18. Ejaculatory reservoir divided into two ducts by means of an internal septum---------------- 19

Ejaculatory reservoir simple, with posterior canal (Fig. 128)----------------------------- 20

19. Claspers flattened, leaf-like; lateral borders of pygophoral opening smooth--Padaeus Stål, 1962

Claspers, stout, wide, apically produced into a cylindrical process (Fig. 175); lateral borders of pygophoral opening with a small oblong process, one on each side (Fig. 173)
-------------------------- Proxys Spinola, 1837

20. Ventral margin of pygophore flattened with two longitudinal ridges medianly (Fig. 124)
--------------------------Arvelius Spinola, 1837

Ventral margin without ridges ------------- 21

21. Claspers apically trilobed (Fig. 216)------- 22

Claspers not lobed----------------------- 23

22. Conjunctival appendages voluminous bag-like structures (Fig. 204). Dorsal margin of pygophore with a few setae---------- *Rhytidolomia* Stål, 1872
Chlorochroa Stål, 1872

Conjunctival appendages somewhat C-shaped. Dorsal margin of pygophore with two distinct patches of stout setae, one on either side of the mid-line (Fig. 134)----------------- *Vulsirea* Spinola, 1837

23. Ejaculatory reservoir with no internal canal, simple sac-like (Fig. 143)----------------------24

Ejaculatory reservoir with posterior canal--26

24. Median penal lobes produced into a sheath around apex of vesica------------------------- 25

Median penal lobes produced into two tubular processes one on either side of apex of vesica (Fig. 142) ------------- *Acrosternum* Fieber, 1861

25. Endophallic duct with a well developed broad curved dorsal flange (Fig. 118). Clasper small knob-like ------- *Mormidea* Amyot and Serville, 1843

Endophallic duct without flange, slightly curved at apex. Clasper C-shaped with teeth on inner margin (Fig. 102)---------- *Solubea* Bergroth, 1891

26. Conjunctival appendages basally with four distinct lobes (Fig. 98), second conjunctival appendages with well sclerotized apices.
------------------------- *Piezodorus* Fieber, 1861

First conjunctival appendages without

sclerotized apices; second absent-------------- 27

27. Claspers oblong flattened leaf-like (Fig. 221). Ventral margin of pygophore with two double knobbed processes, one on each side laterally (Fig. 220)----------------------<u>Banasa</u> Stål, 1860

Claspers generally C-shaped or T-shaped when viewed laterally. No processes on ventral margin of pygophore.------------------------------------ 28

28. First conjunctival appendages distinctly bilobed, apex of one lobe sclerotized----------------------29

First conjunctival appendages bag-like structures not divided------------------------------30

29. Ejaculatory reservoir globose (Fig. 165); median penal lobes curved around apex of vesica ------------------------------<u>Thyanta</u> Stål, 1862

Ejaculatory reservoir elongate; median penal lobes not curved around apex of vesica ---------------------------<u>Mecidea</u> Dallas, 1851

30. Apex of vesica short, not projecting beyond margins of median penal lobes (Fig. 159). Ejaculatory reservoir elongate, dorsal margin entire.------------- <u>Nezara</u> Amyot and Serville, 1843

Apex of vesica projecting well beyond margins of median penal lobes. Ejaculatory reservoir oblong, dorsal margin with a deep groove (Fig. 261) ------------- <u>Brochymena</u> Amyot and Serville, 1843

Key to Some Species of North American Cydnidae Based on Male Genitalia

1. One pair of heavily sclerotized conjunctival appendages; infra vesicular process present (Fig. 401)-------------------*Cyrtomenus crassus*

Two to three pairs of conjunctival appendages -- 2

2. Ejaculatory reservoir with long convoluted duct (Fig. 397)---------------*Pangaeus aethiops*

Convoluted duct absent---------------------3

3. Ejaculatory duct simple sac-like (Fig. 387)--4

Ejaculatory reservoir comples (Fig. 405)----5

4. Theca with a large appendage on lateral margins; three pairs of sclerotized conjunctival appendages (Fig. 386) ---------------- *Corimelaena pulicaria*

Theca without appendages; one pair of bifid membraneous conjunctival appendages (Fig. 389) --------------------------------*Sehirus cinctus*

5. Pygophoral opening surrounded by a broad flange (Fig. 406); seminal duct opening apically into a long posterior canal (Fig. 410) ------------------------------*Amnestus pallidus*

Pygophoral opening with flange around opening, ventrally narrow (Fig. 402); ejaculatory reservoir a complicated spiral structure (Fig. 405) -------------------------*Melanaethius subglaber*

Key to Families and Subfamilies of North American Pentatomoidea Based on Female Genitalia

1. Spermatheca with elongate membraneous dilation (Fig. 452) and elongate central sclerotized rod; pumping region well developed, spermathecal bulb with or without appendages; sclerotized rami absent ---------------------------- PENTATOMIDAE PENTATOMINAE

   Spermatheca not as above, spermathecal bulb never with projections---------------------------- 2

2. Spermatheca with sclerotized globose dilation (Fig. 443) with distinct external markings; sclerotized and interlocking rami present -------------------------------- SCUTELLERIDAE SCUTELLERINAE

   Spermatheca without globose sclerotized dilation, or if present, rami absent ----------- 3

3. Genital chamber with a well marked sclerotized groove (Fig. 419)------------------------------ 4

   Genital chamber without groove-------------- 6

4. Sclerotized and paired rami present, spermathecal duct simple (Fig. 419)----SCUTELLERIDAE EURYGASTRINAE

   Outer rami only may be present in one species (<u>Chelysomidea</u> <u>guttata</u>) otherwise absent. Spermatheca with or without diverticulum or dilation---5

5. Two accessory sac-like diverticulae (Fig. 508) opening into genital chamber near spermathecal opening; spermathecal duct with a third diverticulum attached mid-way ---------------------- CYDNIDAE
Galgupha nitiduloides

Either no diverticulum or one diverticulum with elongate duct attached to base of spermathecal duct (Fig. 434) or diverticulum attached mid-way to duct (Fig. 426) -------------- SCUTELLERIDAE
ODONTOSCLERINAE
PACHYCORINAE

6. Spermathecal duct simple, with no makred dilation ------------------------------------ 7

Spermathecal duct with membraneous dilation and short internal rod (Fig. 511) (somewhat globose in case of *Cyrtomenus crassus*).
------------------------------------ CYDNIDAE
CYDNINAE

7. Ring sclerites present (Fig. 502)
------------------------------- TESSARATOMIDAE

Ring sclerites absent ------------------------- 8

8. Spermathecal duct short, stout, basally broad and annulated (Fig. 519) -------------- CYDNIDAE
Sehirus cinctus

Spermathecal duct elongate narrow ---------- 9

9. Sclerotized paired rami present
------------------------------- PENTATOMIDAE
ACANTHOSOMINAE

Sclerotized rami absent ------------ CYDNIDAE
CORIMELAENINAE
Corimelaena pulicaria

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TABLE 1. CHARACTERS IN THE MALE GENITALIA

	Pygophore	Clasper	No. of Conjunctival Appendages
Odontoscelini			
Vanduzeeina balli	Broad flange around opening	Hook-like	3
Phimodera binotata	Dorsal margin vertical	Bifid, shallow	1
Euptychodera corrugata	Broad flange around dorsal opening	Hook-like	3
Fokkeria producta	"	"	3
Eurygastrini			
Eurygaster alternata	Ventral margin flattened	T- shaped	3
Pachycorini			
Stethaulax marmoratus	Ventral margin flattened	Broad, hook	2
Sphyrocoris obliquus	Broad flange around opening	Scythe shaped	2
Homaemus aeneifrons	"	Hook-like	3
Diolcus irroratus	Small flange around opening	Shallow hook	1
Tetyra antillarum	Dorsal border vertical	Hook-like	2
Pachycoris	2 bifid lateral and one median process on dorsal margin		

Remarks	Vesica	Ejaculatory Reservoir
IIIrd minute	With 2 spiny lateral lobes near apex of endophallic duct	Trilobed, simple
Membraneous		With posterior canal and internal duct. Endophallic duct with short convoluted passage
IIIrd broad spiny	Narow, flattened dorso-ventrally	Bilobed, simple
"	Strap-like dorso-ventrally compressed dorsal surface near base	Bilobed, simple
IIIrd small. Theca with ventral process	Large cylindrical dorsal surface near base with 2 processes	Simple with anterior sinus divided into 2 chambers. Apex of endophallic duct membraneous
	Broad flattened dorso-ventrally	Convoluted duct present, reservoir divided into 2 chambers
	Spined with large spiny process in apposition	Simple with anterior sinus
IIIrd broad spiny	Vesica broad, apically blunt, spined, base coiled	Very small sac-like
Theca with dorsal process	Enclosed by conjunctiva	Absent, pumping mechanism present
	Dorsal margin with triangular process	S-shaped, simple sac-like
	Very small	Absent, endophallic duct opening at base of 3rd conj. appendages

TABLE 1. Continued.

	Pygophore	Clasper	No. of Conjunctival Appendages
Acantholomidea porosa	Broad flange around opening	Shallow hook	3
Symphylus carribeanus	Ventral margin flattened	T-shaped	2
Camirus moestus	Flange around opening	Hook-like	2
Chelysomidea guttata	Ventral border flattened	Hook-like	2
Scutellerini			
Augocoris gomesii	Dorsal border flattened	Hook-like	2

Remarks	Vesica	Ejaculatory Reservoir
		S-shaped, simple, endo-phallic duct extremely short
1st very long	Spined median penal lobes round apex of endophallic duct	S-shaped divided into 2 chambers
	Enclosed in spiny sheath	Convoluted duct present, reservoir with internal duct
		Simple sac-like, apex of endophallic duct diffuse.
	Heavily sclerotized S-shaped	Convoluted duct present reservoir with internal duct.

TABLE 2. THE PRESENCE OR ABSENCE OF CHARACTERS IN THE MALE GENITALIA OF NORTH AMERICAN PENTATOMINAE

	A Thecal shield	B Number of conjunctival appendages	C Median penal lobes	D Vesica short	E Vesica very long coiled	F Ejaculatory reservoir simple with posterior canal	G Ejaculatory reservoir with one or two internal ducts	H Genital plates
Pentatomini								
Peribalus limbolarius	+	1	+	+		−	+	
Trichopepla semivittata	-	1	-	+		+		
Rhytidolomia-Chlorochroa grp.	-	1 (bilobed)	+	+		+		
Carpocoris remotus	-	1	-	+		+		+
Mormidea lugens	-	1	+	+		+		
Solubea pugnax	-	1	+	+		+		
Euschistus tristigmus	-	2	+	−	+	−	+	1
Hymenarcys nervosa	-	1	+	−	+	−	+	1
Neottiglossa trilineata	+	1 (conj. lobe)	+	+		+		
Cosmopepla bimaculata	-	1 (bilobed)	-	+		+		
Menecles insertus	-	2 (2nd 5 lobed)	+	−	+	−	+	1
Thyanta perditor	-	1	+	+		+		
Loxa flavicollis	+	0	+	+		+		
Murgantia histrionica	+	1	+	+		−	+	
Nezara viridula	-	1	+	+		+		

TABLE 2. Continued

	A	B	C	D	E	F	G	H
Piezodorus lituratus	-	2	+	+		+		
Arvelius albopunctatus	-	2	+	+		+		
Brepholoxa heidmanni	-	1	-	+		+		
Dendrocoris humeralis	-	1	-	+		-	+	
Padaeus viduus	-	2	+	+		+		1
Proxys punctulatus	-	2	+	+		+		1
Coenus delius	-	1	+	-	+	-	+	1
Aelia americana	+	1	+	+		+		
Eysarcoris intergressus	-	2	-	+		+		
Prionosoma podopioides	-	1	+	-	+	-	+	1
Acrosternum pensylvanicum	-	1	+	+		-	+	
Banasa dimidiata	-	1	+	+		+		
Chlorocoris subrugosus	-	0	+	+		+		
Vulsirea violacea	-	1	+	+		+		
European genera								
Pentatoma rufipes	-		+	+		+		+
Eysarcoris aeneus	-		-	+		+		
Halyini								
Brochymena quadripustulata	-		+	+		+		

TABLE 2. Continued.

	A	B	C	D	E	F	G	H
Edessini								
Edessa bifida	-	1	-	+	-	-	+	
Discocephalini								
Lineostethus clypeatus	-	0	-	+	-	+		
Sciocorini								
Sciocoris micropthalmus	+	1	+	+	-	-	+	
Mecidiini								
Mecidea longula	-	1 (bi-lobed)	+	+	-	+		

Note 1. Theca with one pair of dorsal processes

\+ Indicates presence of a character

\- Indicates absence of a character

TABLE 3. CHARACTERS IN THE MALE GENITALIA

	Pygophore	Clasper	No. of Conjunctival Appendages
CORIMELAENINAE			
Corimelaena pulicaria	Broad flange around opening	Tube-like	3
CYDNINAE			
Sehirini			
Sehirus cinctus	Broad flange around opening	Broad hook	1
Cydnini			
Pangaeus aethiops	Ventral border flattened	Broad spatulate	3
Cyrtomenus crassus	Dorsal border flattened	Spatulate	1
Melanaethus subglaber	Flange around opening		2
Amnestini			
Amnestus pallidus	Broad flange around opening	Small, flattened	2

.OF SOME NORTH AMERICAN CYDNIDAE

Remarks	Vesica	Ejaculatory Reservoir
Theca with paired appendages		Simple,sac-like
Bilobed	Small	Simple, sac-like
IIIrd balloon-like	Heavily sclerotized	Convoluted duct present, reservoir with internal duct
Heavily sclerotized	Infravesicular process present	Reservoir with internal duct
	Small	Complex, spiral
1st divided	Elongate	Posterior canal very long, reservoir with internal duct

.TABLE 4. PRESENCE OR ABSENCE OF CHARACTERS IN NORTH AMERICAN FEMALE SCUTELLERINAE

	Sclerotized rami	Sclerites around opening of spermatheca	Sclerotized groove in genital chamber	Spermatheca dilation	diverticulum
Odontoscelini					
Vanduzeeina balli	-	-	-	-	-
Phimodera binotata	-	+	+	+	-
Euptychodera corrugata	-	-	+	-	-
Fokkeria producta	-	-	+	-	-
Eurygastrini					
Eurygaster alternata	+	-	+	-	-
Pachycorini					
Stethaulax marmoratus	-	-	+	-	+ 1
Sphyrocoris obliquus	-	-	+		-
Homaemus aeneifrons	-	-	+	-	-
Diolcus irroratus	-	-	+	2	-
Tetyra antillarum	-			-	+ 1
Pachycoris torridus	-	+	+	+	-
Acantholomidea porosa	-	-	+	-	+ 3
Symphylus carribeanus	-	-	+	+	-
Chelysomidea guttata	+ Outer only	+	+	-	-
Scutellerini					
Augocoris gomesii	+	-	-	2	-

1- Dilation attached mid-way to spermathecal duct.

2- Dilation tough thickened.

3- Diverticulum attached at spermathecal opening.

TABLE 5. THE PRESENCE OR ABSENCE OF CHARACTERS IN THE FEMALE GENITALIA OF NORTH AMERICAN PENTATOMINAE

	A Spiracles on eighth paratergites	B Ring sclerites	C Sclerites around opening of spermatheca	D Spermathecal duct with elongate dilation and central sclerotized rod	E Processes on spermathecal bulb	Number
Pentatomini						
Chlorocoris subrugosus	+	-	+	+	+	3
Peribalus limbolarius	+	-	+	+	+	2
Neotiglossa trilineata	-	-	+	+	+	3
Loxa flavicollis	+	-	+	+	+	3
Nezara viridula	+	-	+	+	+	2
Arvelius albopunctatus	+	-	+	+	+	3
Aelia americana	-	-	+	+	+	2
Acrosternum pensylvannicum	-	-	+	+	+	2
Vulsirea violacea	+	-	+	+	+	4
Trichopepla semivittata	+	-	-	-	- 1	
Rhytidolomia-Chlorochroa group	+	-	+	+	-	
Carpocoris remotus	+	-	+	+	-	
Mormidea lugens	-	-	+	+	-	
Solubea pugnax	-	-	+	+	-	
Euschistus tristigmus	-	-	+	+	-	

TABLE 5. - Continued.

	A	B	C	D	E	Number
Hymenarcys nervosa	-	-	+	+	-	
Cosmopepla bimaculata	-	-	+	+	-	
Menecles insertus	-	-	+	+	-	
Thyanta perditor	+	-	+	+	-	
Murgantia histrionica	+	-	+	+	-	
Brepholoxa heidmanni	-	-	+	+	-	
Dendrocoris humeralis	-	-	+	+	-	
Padaeus viduus	+	-	+	+	-	
Proxys punctulatus	-	-	+	+	-	
Coenus delius	-	-	+	+	-	
Eysarcoris intergressus	-	-	+	+	-	
Prionosoma podopioides	-	-	+	+	-	
Banasa dimidiata	+	-	+	+	-	
European genera						
Pentatoma rufipes	+	+	+	+	+	2
Eysarcoris aeneus	-	+	+	+	-	
Halyini						
Brochymena quadripustulata	+	-	+	+	+	2
Edessini						
Edessa bifida	+	-	+	+	+	3
Discocephalini						
Lineostethus clypeatus	+	-	+	+	-	
Sciocorini						
Sciocoris micropthalmus	-	-	+	+	-	
Mecidiini						
Mecidea longula		-	+	+	-	

Note. 1. Spermatheca simple sac
+ Indicates presence of a character
- Indicates absence of a character

TABLE 6. CHARACTERS IN THE FEMALE GENITALIA AND SPERMATHECA OF SOME NORTH AMERICAN CYDNIDAE

	Spermathecal duct with dilation and stout internal sclerotized rod.	Other	Sclerotized groove at base of spermathecal opening into genital chamber
Corimelaeninae Corimelaena pulicaria	-		-
Galgupha nitiduloides	-	2 accessory sacs attached near base of spermatheca; spermathecal duct with diverticulum attached mid-way	+
Cydninae Cydnini Pangaeus aethiops	-		-
Dallasiellus discrepans 1	+		-
Cyrtomenus crassus	+		-
Sehirini Sehirus cinctus		Base of spermathecal duct dilated	
Amnestini Amnestus pusio	-	Diverticulum opening at base of spermathecal duct	-
Amnestus pallidus	--	"	-

Note 1. - Ring sclerites present

KEY TO LETTERING OF FIGURES

Figures 1 - 419 (Male genitalia)

A. ch., anterior chamber of ejaculatory reservoir

A.s., anterior sinus

A. th. pr., anterior thecal process

Ap., apodeme

Ar. cl., arm of clasper

B.p., basal plate

C. ap., conjunctival appendage

1 C. ap., first conjunctival appendage

2 C. ap., second conjunctival appendage

3 C. ap., third conjunctival appendage

C. ap.$_2$, branch of second conjunctival appendage

C. du., convoluted duct

C. lo., conjunctival lobe

Ca., canal

Cal. callous

Ce. s., central sinus

Cl., clasper

D.b., dorsal border of pygophore

D. dv. dorsal diverticulum of theca

D. c. ap., dorsal lobe of conjunctival appendage

D. c. lo., dorsal conjunctival lobe

D. ch., dorsal chamber of ejaculatory reservoir

D. m., dorsal margin of pygophore

D. pr., dorsal process of vesica

D. r., dorsal reservoir

Du., duct

E. res., ejaculatory reservoir

En. d., endophallic duct

En. f., flange of endophallic duct

F., flange around pygophoral opening

G. pl., genital plate

Gp., secondary gonopore

In. r., inferior ridge

Kn., knob

L. a., lower arm of clasper

M. pr., median process

Me. p., median penal lobe

Mu., muscle fibre

P., proctiger

P. ch., posterior chamber of ejaculatory reservoir

P. th. pr., posterior thecal process

Pi., pit

Pr., projection

Pro., process

Py. ap., pygophoral appendage

R., sclerotized ring at base of endophallic duct

Ri., ridge

S. ve. pr., supra vesical process

Se., septum

Se. d., seminal duct

Sh., sheath of vesica

Si., sinous

Sp., spine

St., setae

Su. r., superior ridge

Th., theca

Th. ap., thecal appendage

Th. f., thecal flange

Th. pr., thecal process

Th. s., thecal shield

U. a., upper arm of clasper

V. b., ventral border of pygophore

V. c. ap., ventral lobe of conjunctival appendage

V. c. lo., ventral conjunctival lobe

V. ch., ventral chamber of ejaculatory reservoir

V. m., ventral margin of pygophore

Va., valve

Ve., vesica

Ve. f., vesical flange

Ve. pr., vesical process

Figures 411 - 519 (Female genitalia)

A. s., accessory sac

An., anal opening

B., spermathecal bulb

B. d., bulb of spermathecal duct

D. f., distal flange of pump

Dl., dilation of spermathecal duct.

$Dl._1$, proximal chamber of spermathecal dilation

$Dl._2$, distal chamber of spermathecal dilation

Dt., diverticulum

Fl., flange

Gr., sclerotized groove in floor of genital chamber

1 Gp., first gonapophysis

2 Gp., second gonapophysis

3 Gp., third gonapophysis

1 Gx., first gonocoxae

2 Gx., second gonocoxae

I. r., inner ramus

O., opening of spermathecal duct into genital chamber

O. r., outer rami

P., spermathecal pump

P. f., proximal flange of pump

Pch., pouch in genital chamber

Pr., process of spermathecal bulb

$Pt._8$, paratergite eight

$Pt._9$, paratergite nine

R., sclerotized rod

R. sc., ring sclerite

$S._{10}$, sternum ten

S. du., spermathecal duct

Sc., sclerite

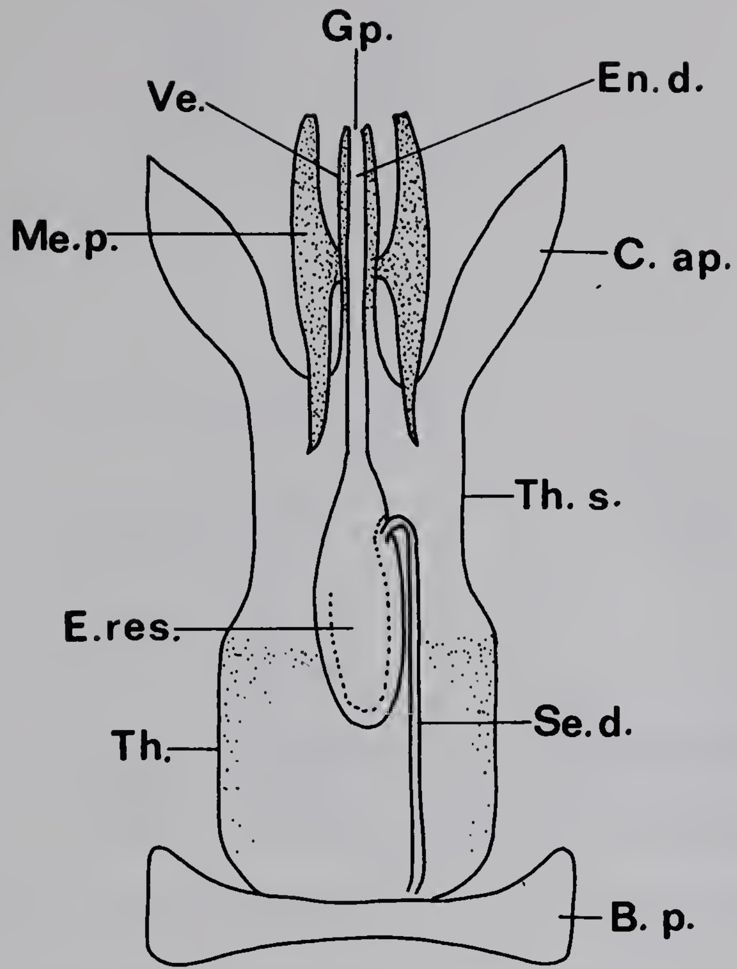
$T._8$, tergum eight

Tr., triangulum

Fig. 1. Generalized diagram of aedoeagus.

Fig. 2. Cross section of vesica of *Lampromicra senator* showing convoluted duct.

Fig. 3. Same enlarged.



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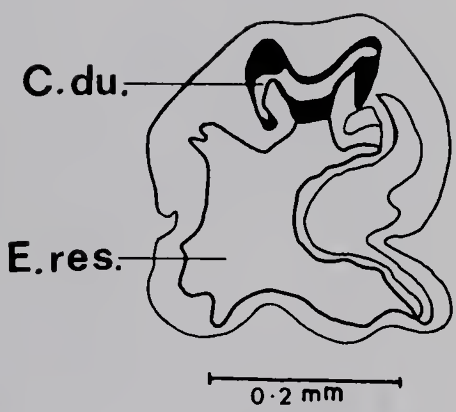

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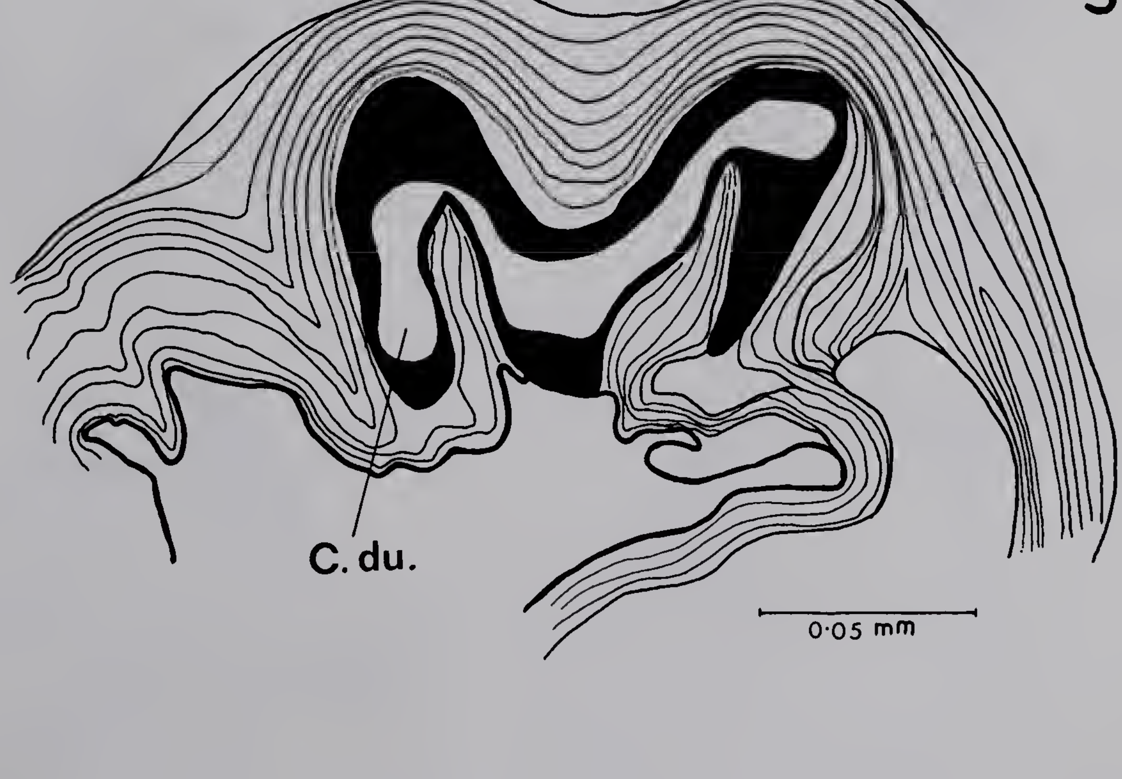
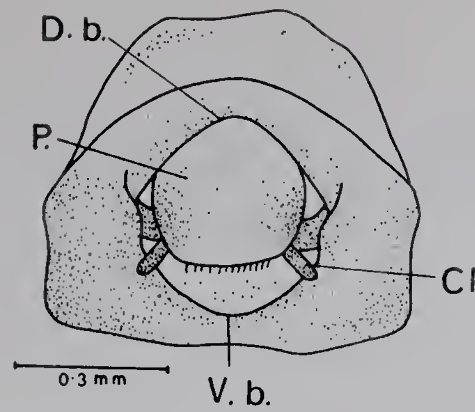


Figs. 4 - 7. Fokkeria producta.

4, Pygophore, dorsal view;
5, clasper; 6, Aedoeagus, lateral view; 7, Vesica, dorsal view.

Figs. 8 - 11. Euptychodera corrugata.

8, Pygophore, dorsal view;
9, clasper; 10, Aedoeagus, lateral view; 11, conjunctival appendages, apical view.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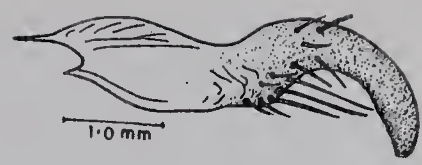
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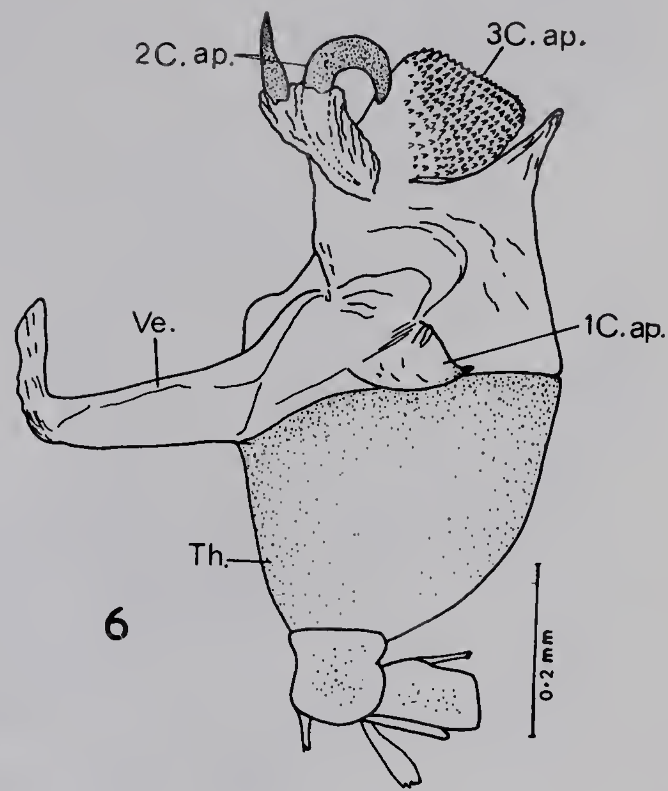
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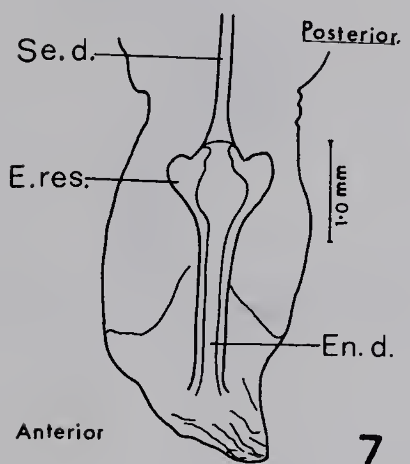
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En. d.
Anterior

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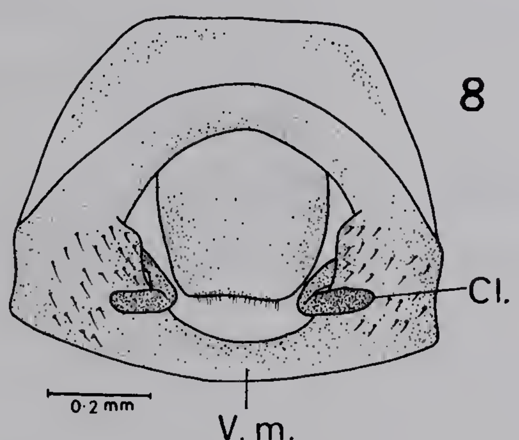
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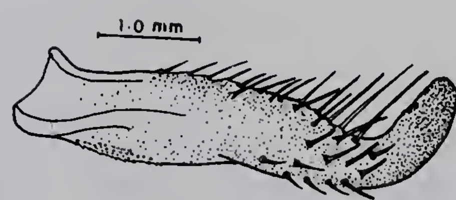
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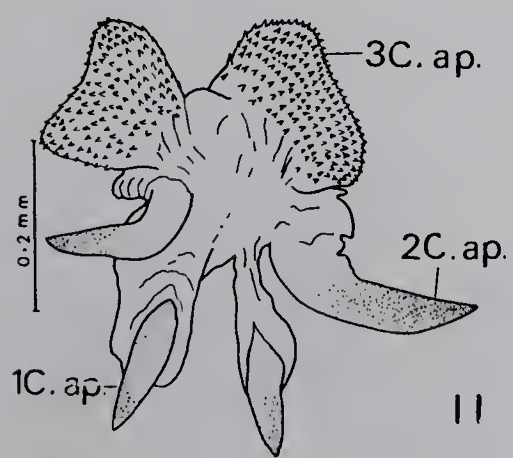
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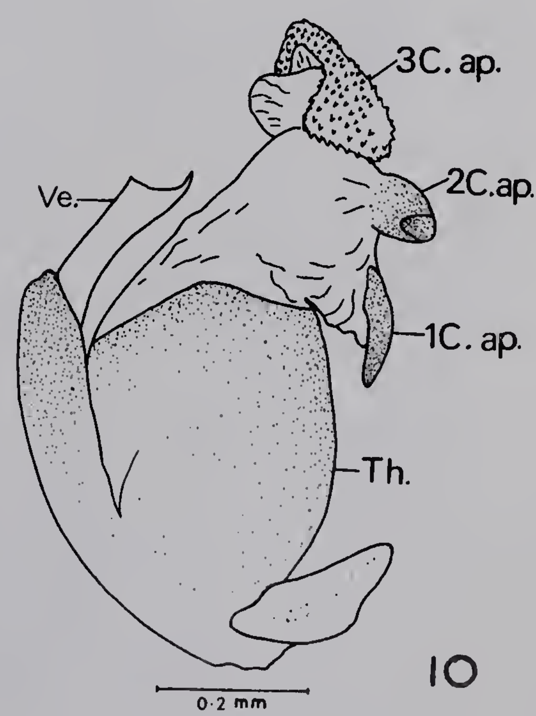
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1C. ap.
Th.
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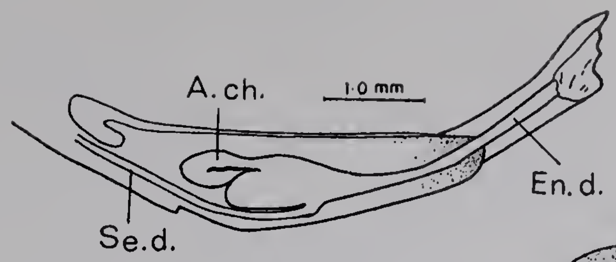
Fig. 12. *Euptychodera corrugata*; vesica; lateral view.

Figs. 13 - 17. *Vanduzeeina balli*; 13, Pygophore, dorsal view; 14, clasper; 15, Aedoeagus, lateral view; 16, Conjunctival appendages, lateral view; 17, Vesica, ventral view.

Figs. 18 - 20. *Phimodera binotata*; 18, Pygophore, dorsal view; 19, clasper; 20, Theca, lateral view.



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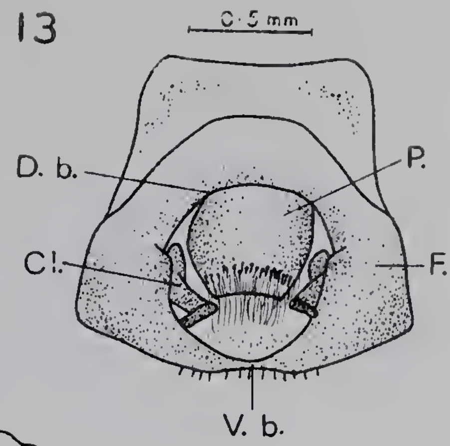

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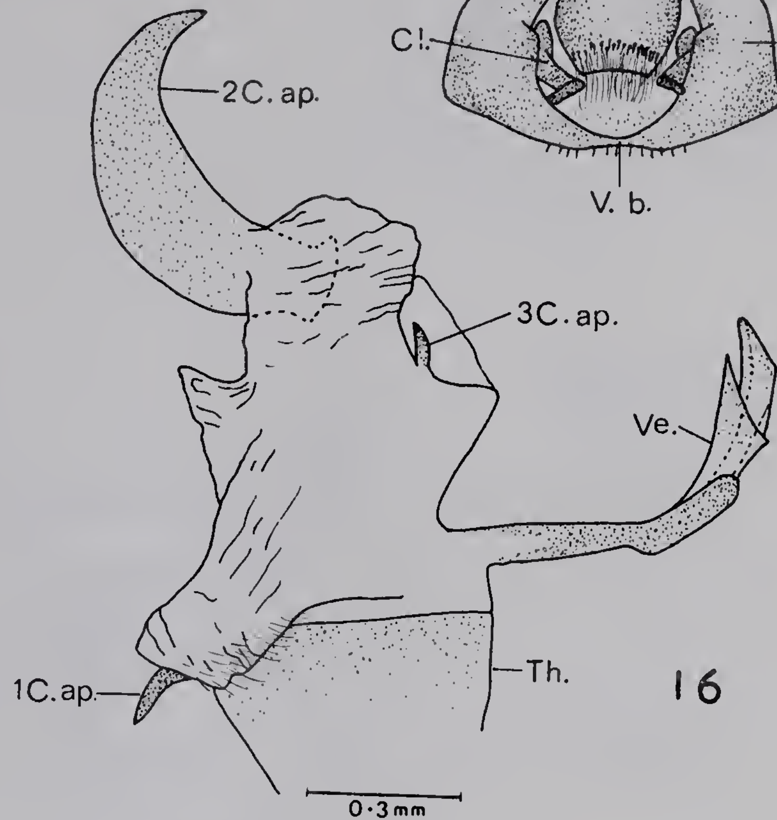

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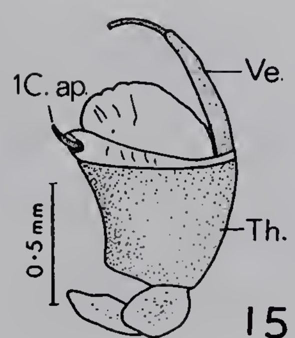

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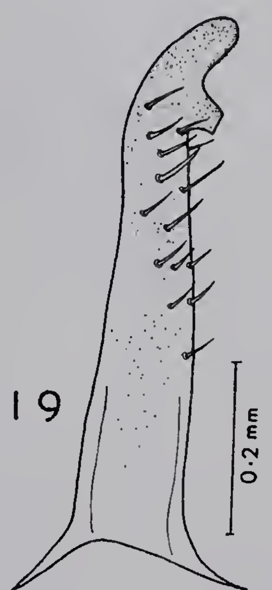

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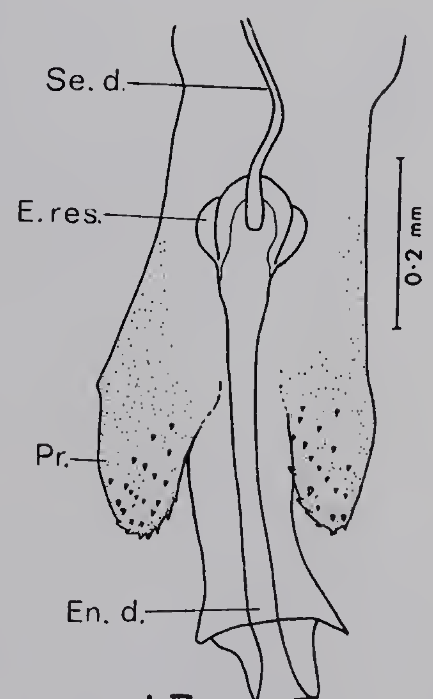

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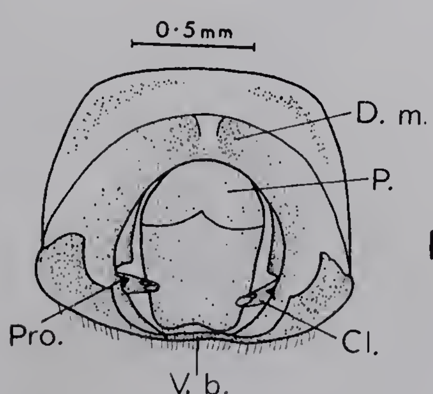
Anterior



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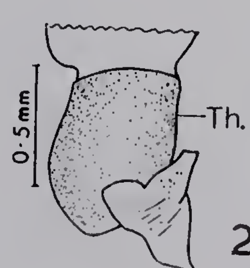

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Figs. 21 - 22. Phimodera binotata;

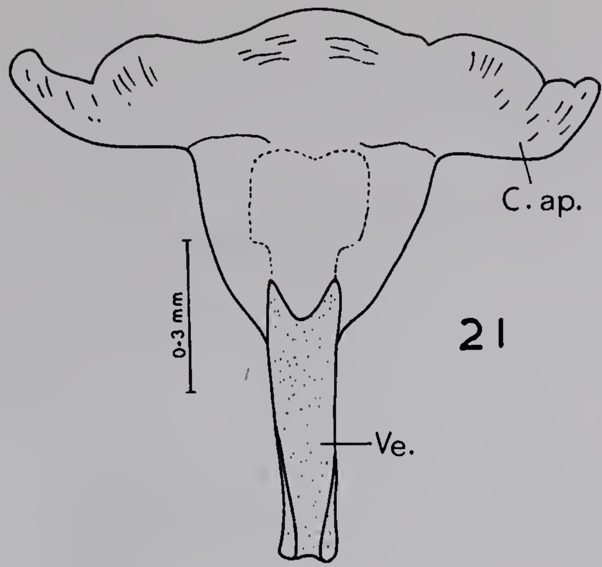
21, Aedoeagus, apical view; 22, Vesica, lateral view.

Figs. 23 - 26. Eurgaster alternata;

23, Pygophore, dorsal view;
24, clasper; 25, Aedoeagus, lateral view; 26, Vesica, lateral view.

Figs. 27 - 29. Camirus moestus;

27, Pygophore, dorsal view
28, clasper; 29, Aedoeagus, lateral view.



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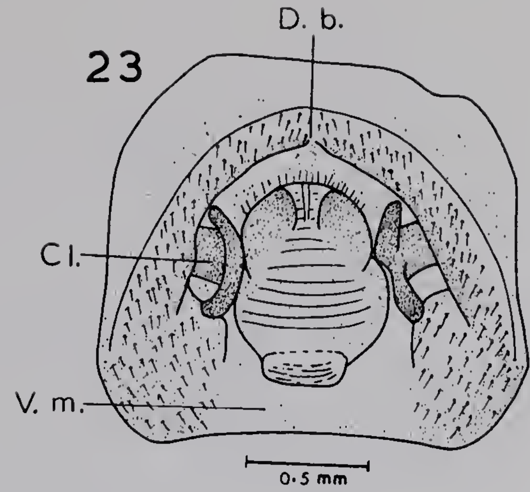

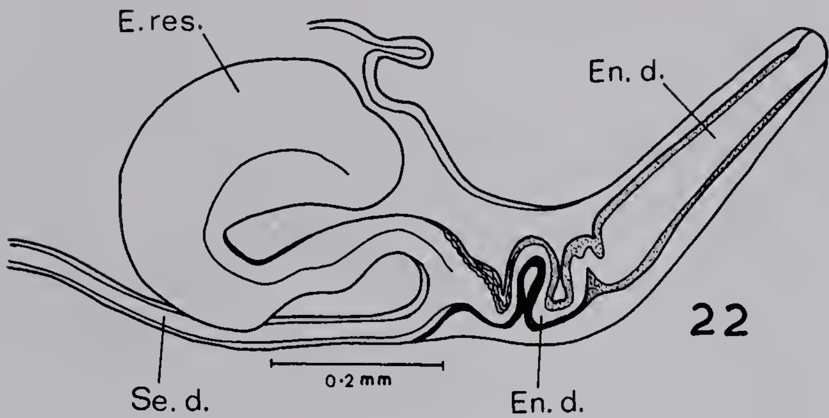

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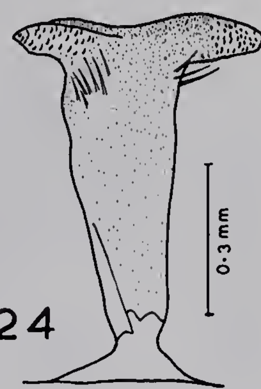

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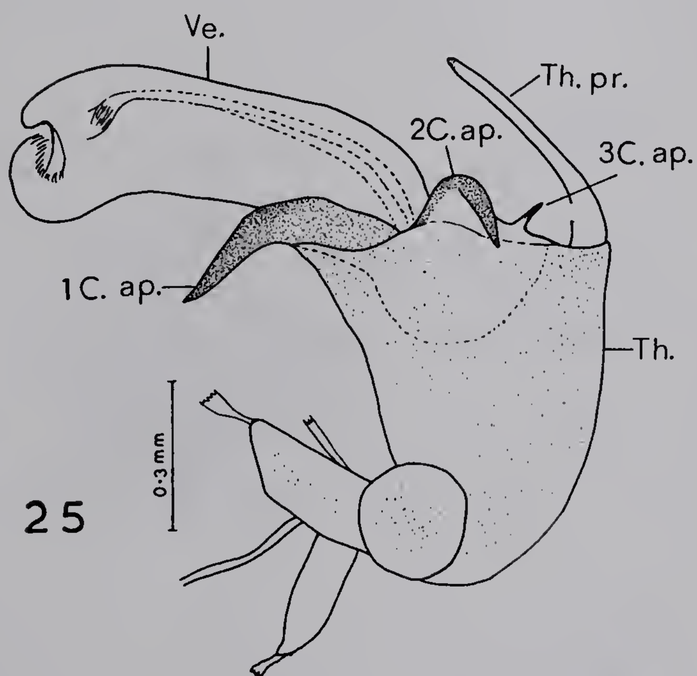

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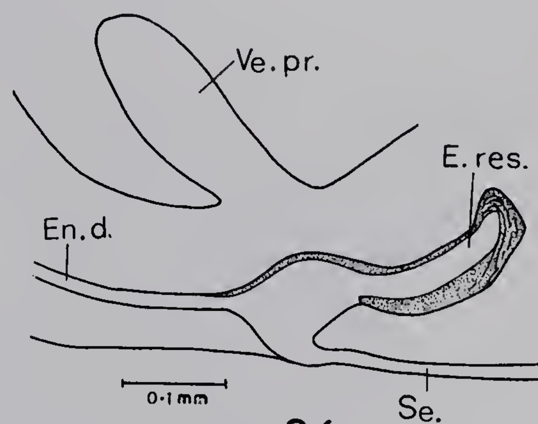

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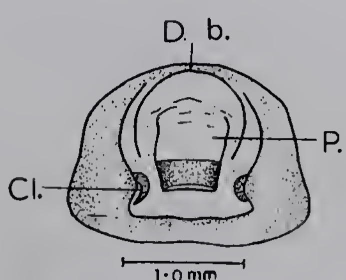

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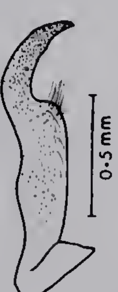

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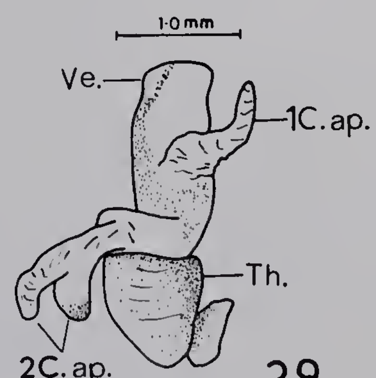

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Figs. 30 - 31. *Camirus moestus*;

30, Vesica, lateral view;

31, Convoluted duct, ventral view.

Figs. 32 - 36. *Pachycoris torridus*;

32, Pygophore, dorsal view;

33, Apex of pygophoral appendage;

34, Clasper; 35, Aedoeagus, lateral view; 36, Vesica, lateral view

Figs. 37 - 40. *Chelysomidea guttata*;

37, Pygophore, dorsal view;

38, clasper; 39, Aedoeagus, lateral view; 40, Vesica, lateral view.

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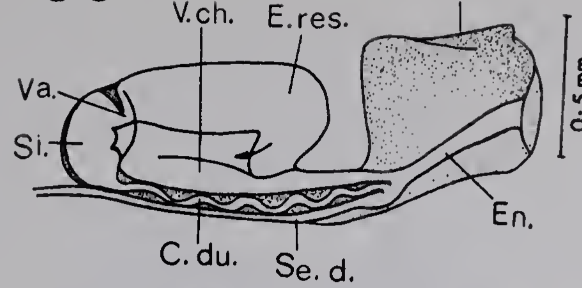

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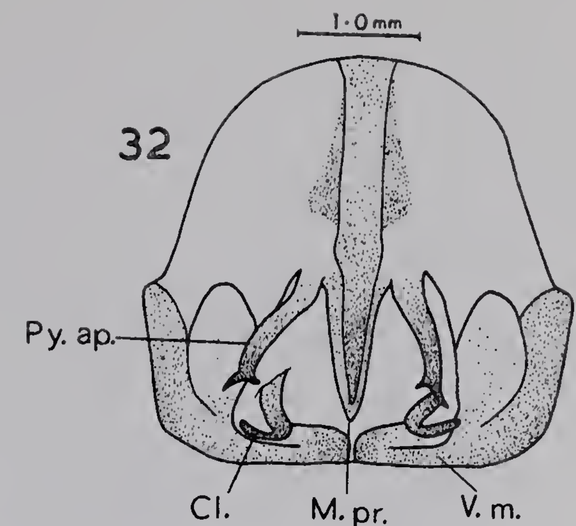

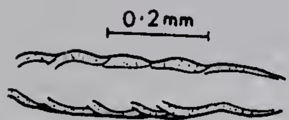

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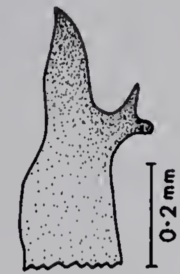

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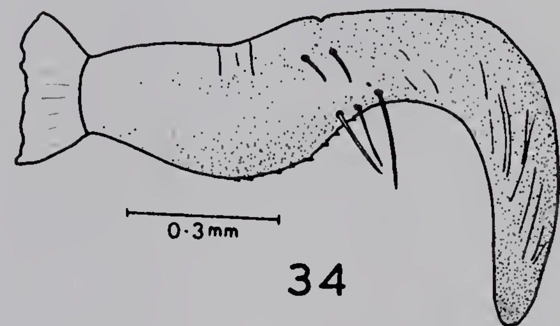

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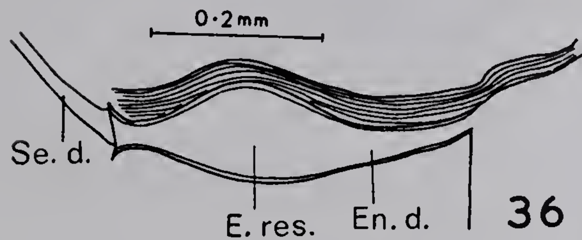

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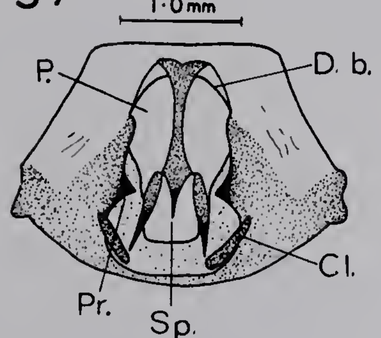

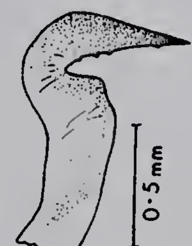

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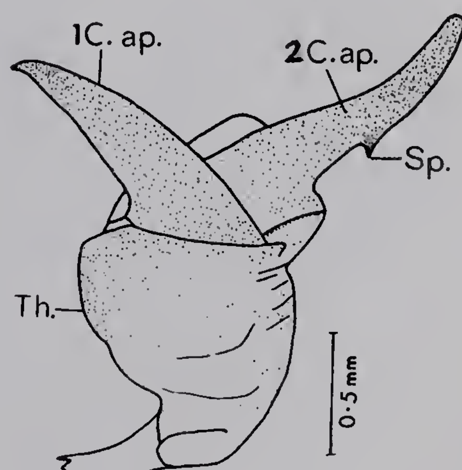

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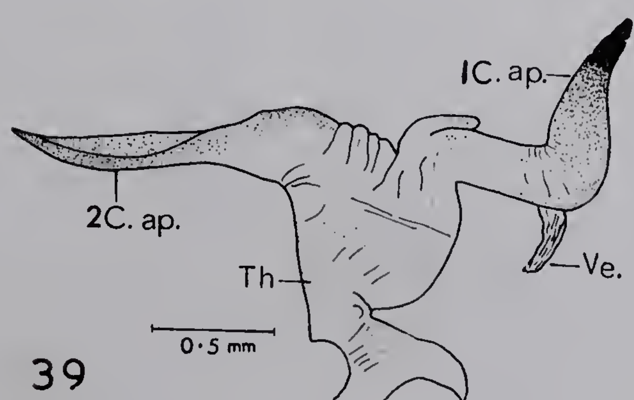

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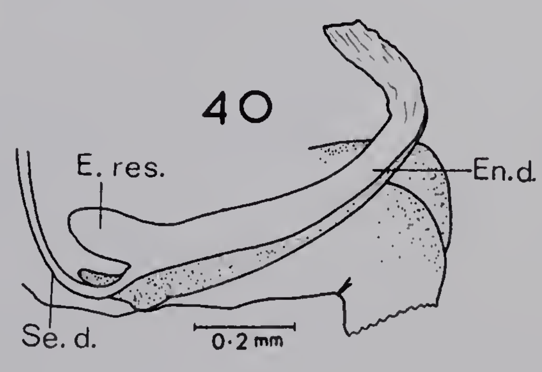

Figs. 41 - 46. Homaemus aeneifrons; 41, Pygophore, dorsal view; 42, Clasper; 43, Aedoeagus, lateral view; 44, Conjunctival appendages, lateral view; 45, Apex of third conjunctival appendage; 46, Vesica, lateral view.

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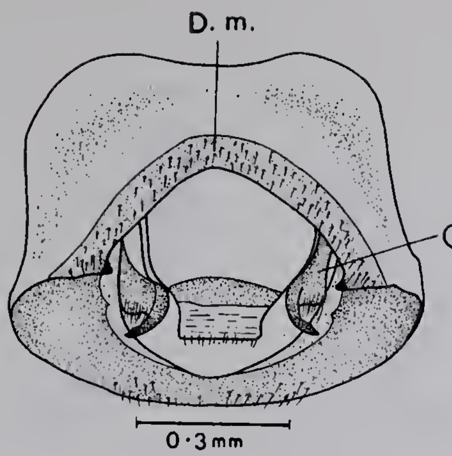

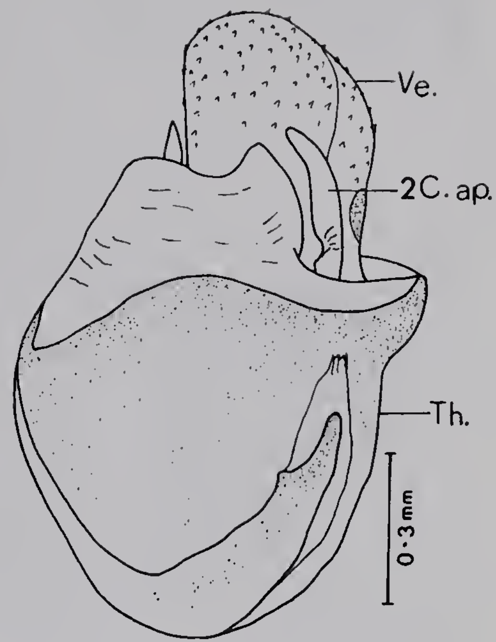

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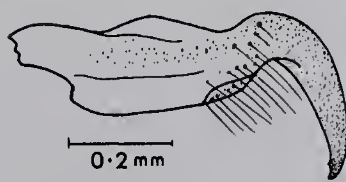

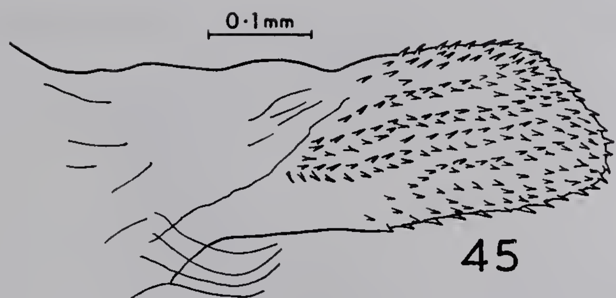

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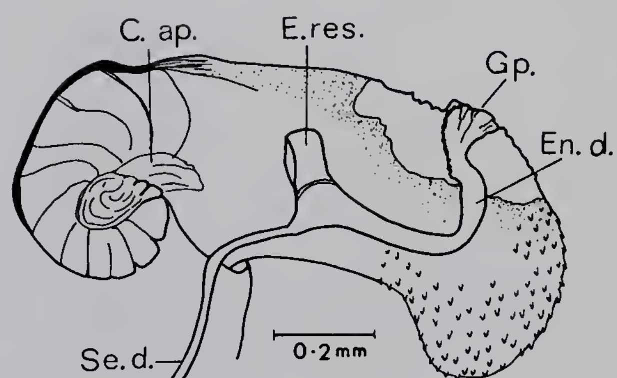

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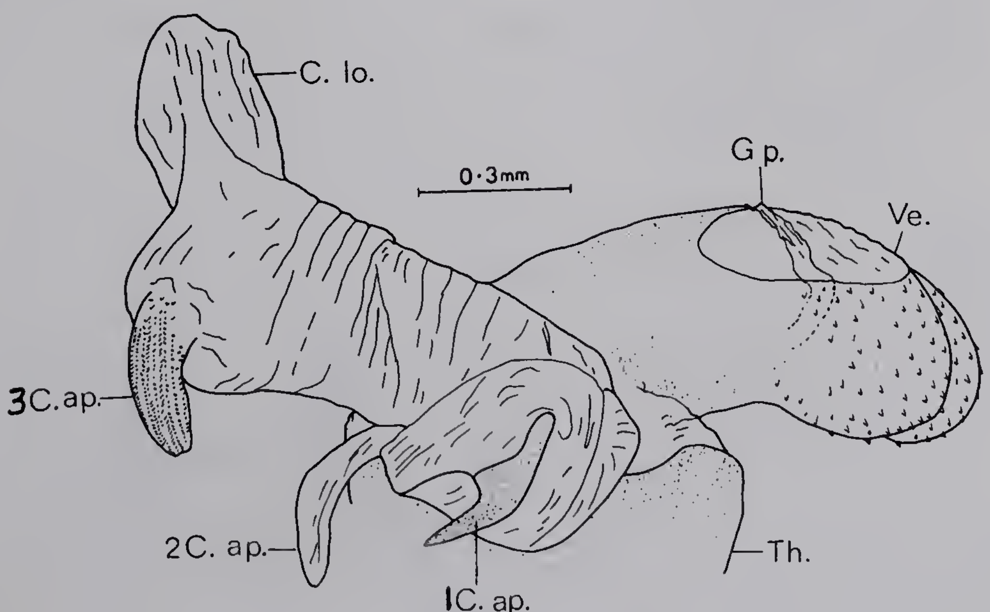

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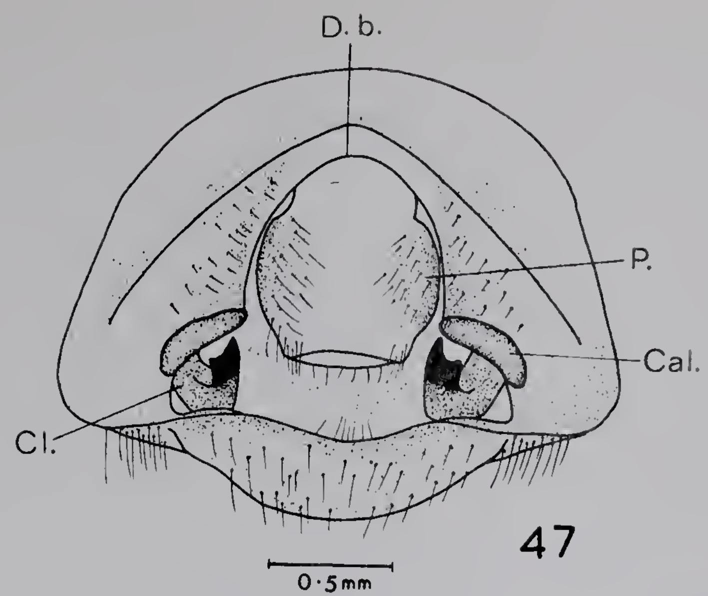
Figs. 47 - 51. *Tetyra antillarum*;
47, Pygophore, dorsal view;
48, Clasper; 49, Aedoeagus, lateral view; 50, Conjunctival appendages, ventral view; 51, Vesica, lateral view.

Figs. 52 - 54. *Sphyrocoris obliquus*.
52, Pygophore, dorsal view;
53, Clasper; 54, Aedoeagus, lateral view.



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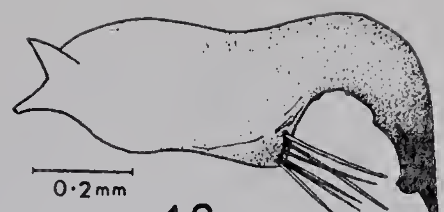

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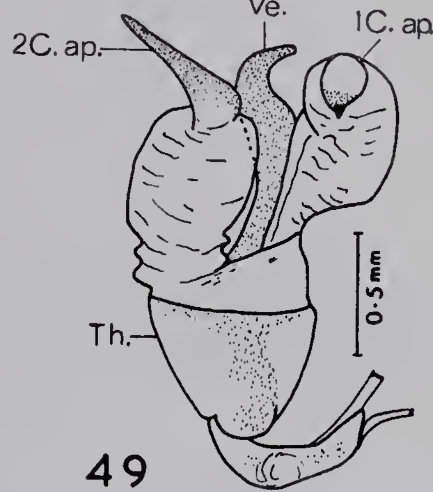

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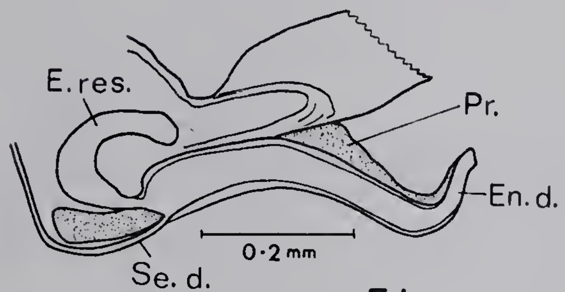

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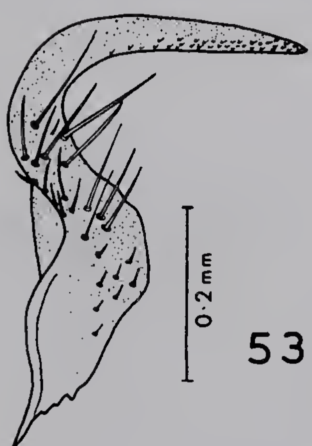

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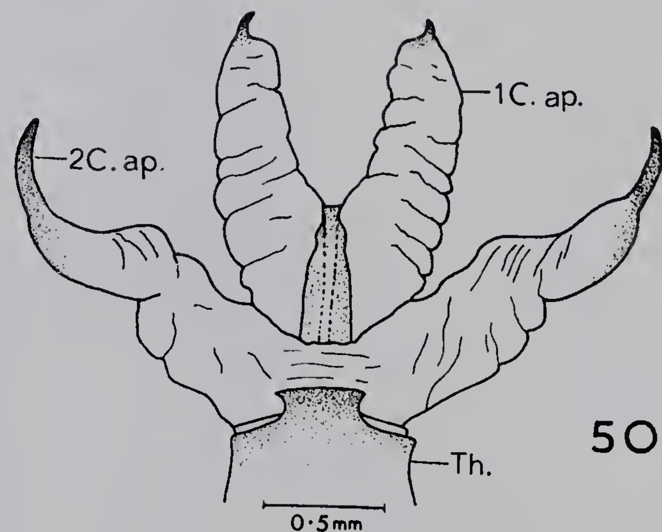

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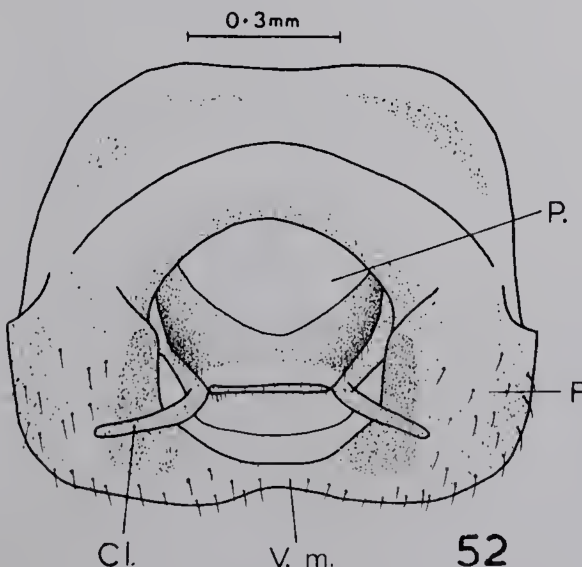

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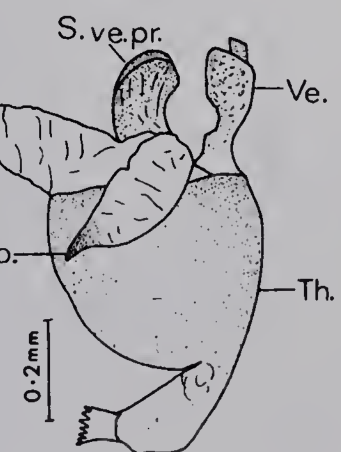

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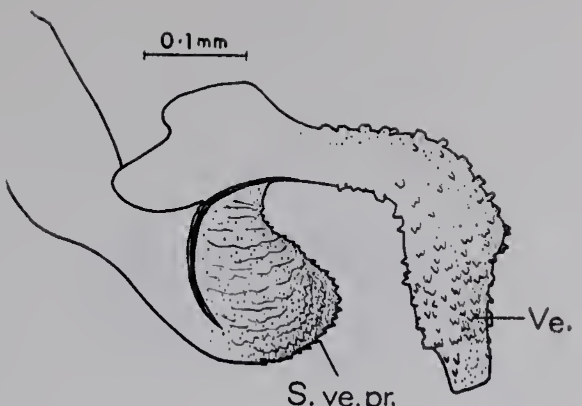
Figs. 55 - 56. <u>Sphyrocoris</u> <u>obliquus</u>.

55, Apex of vesica; 56, Vesica, lateral view.

Figs. 57 - 62. <u>Stethaulax</u> <u>marmoratus</u>.

57, Pygophore, dorsal view; 58, Clasper; 59, Aedoeagus, lateral view; 60, Vesica, dorsal view; 61, Vesica, lateral view.



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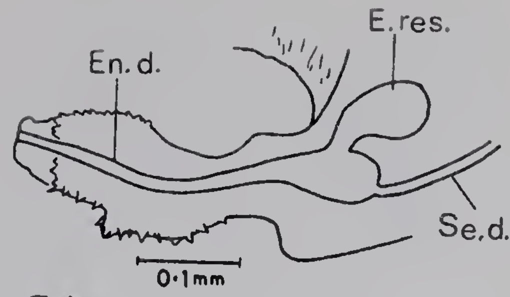

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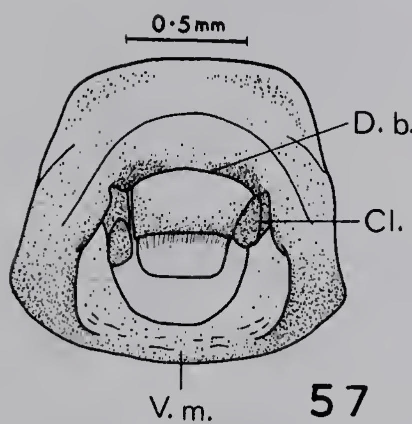

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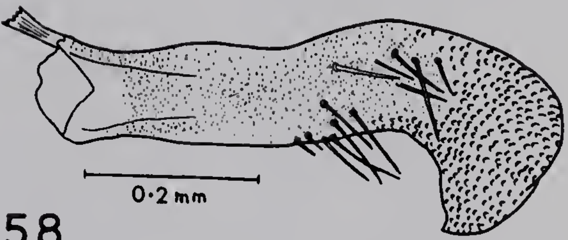

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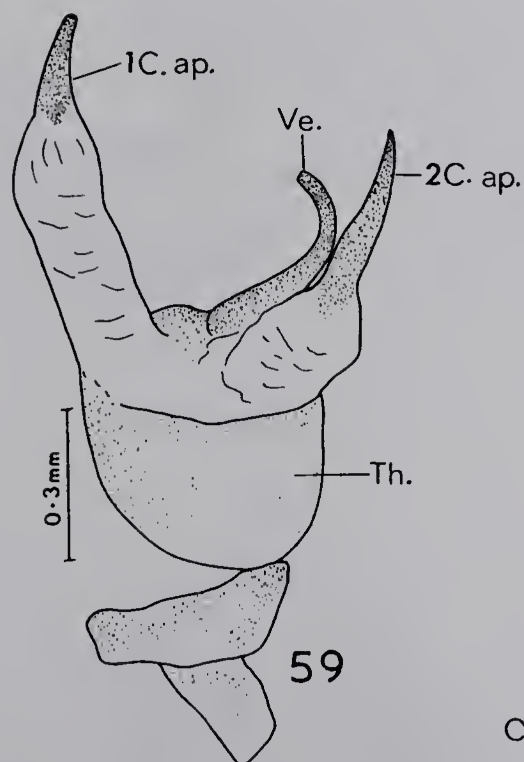

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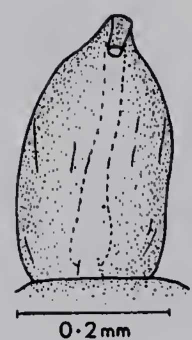

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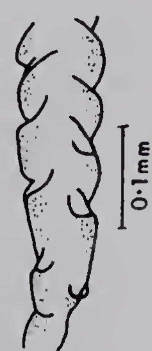

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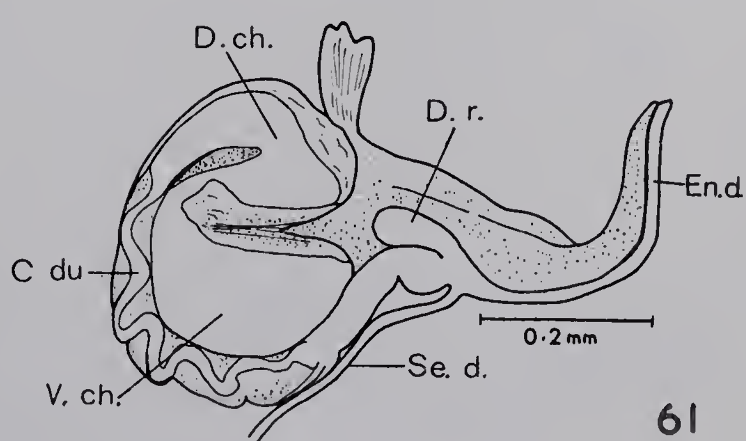

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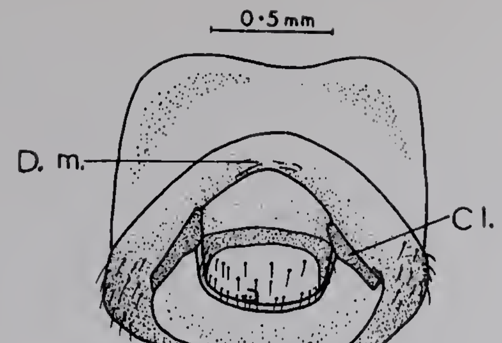
Figs. 63 - 67. Symphylus carribeanus.

63, Pygophore, dorsal view;
64, Clasper; 65, Aedoeagus, lateral view; 66, Median penal lobes, ventral view; 67, Vesica, lateral view.

Figs. 68 - 70. Diolcus irroratus;

68, Pygophore, dorsal view;
69, Clasper; 70, Aedoeagus, lateral view.



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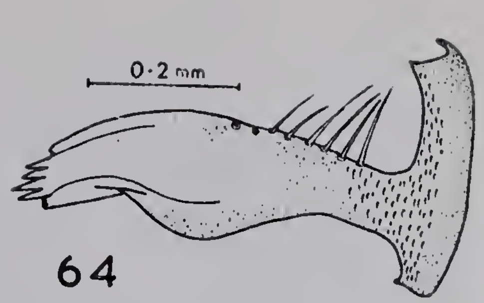

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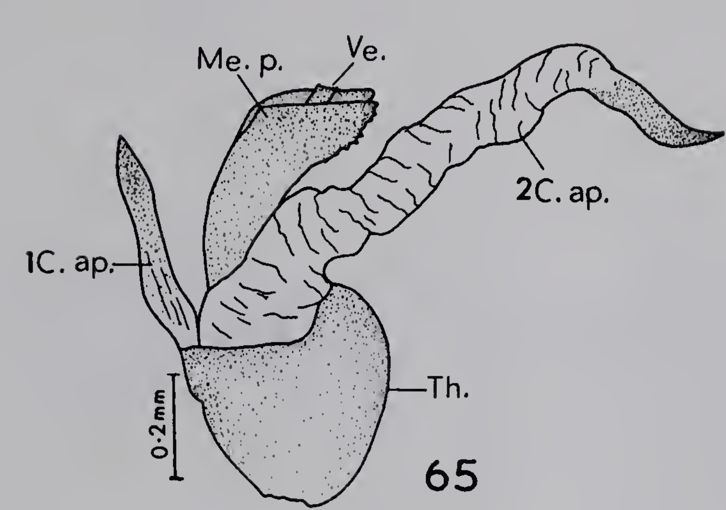

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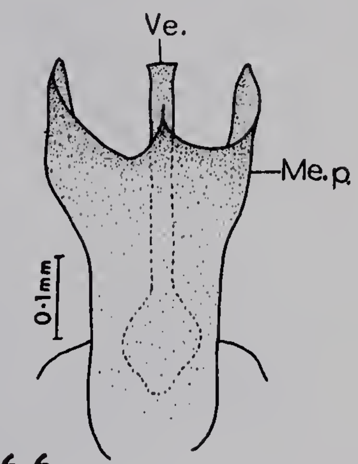

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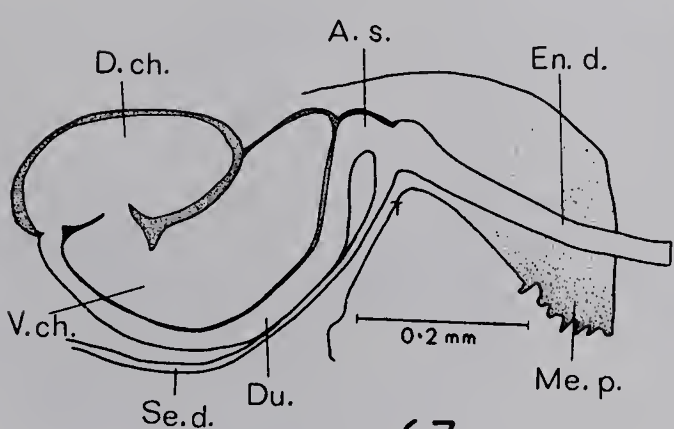

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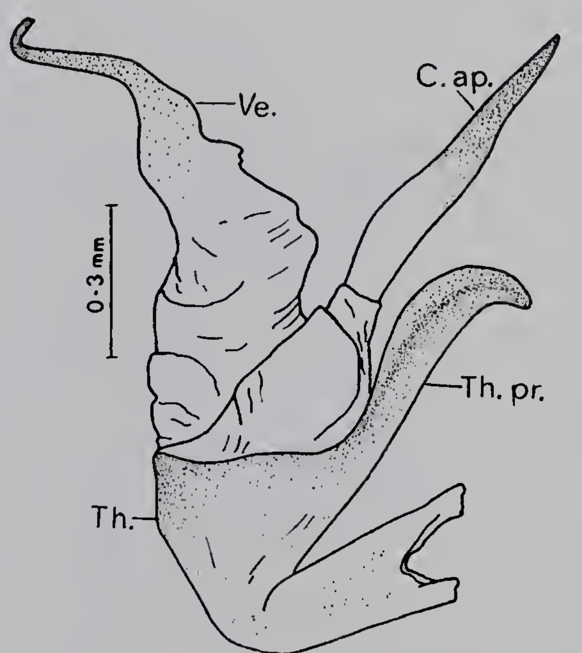

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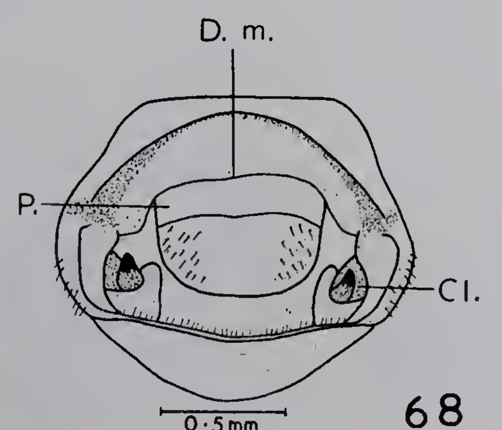

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Figs. 71 - 72. *Diolcus irroratus*.

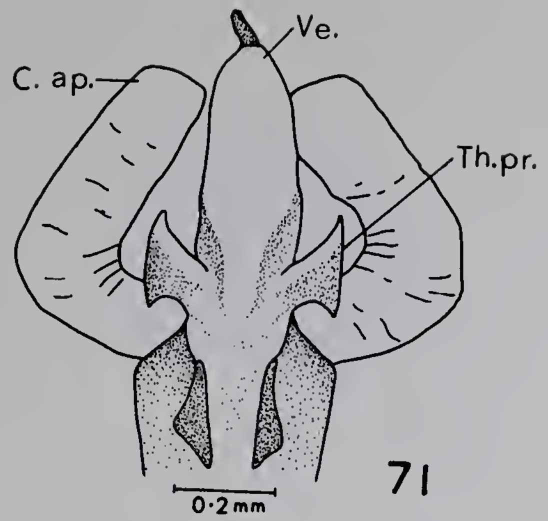
71, Aedoeagus, dorsal view.

72, Vesica, lateral view.

Figs. 73 - 78. *Acantholomidea porosa*.

73, Pygophore, dorsal view;

74, Clasper; 75, Aedoeagus, lateral view; 76, Conjunctival appendages, ventral view; 77, Apex of vesica; 78, Vesica, lateral view.



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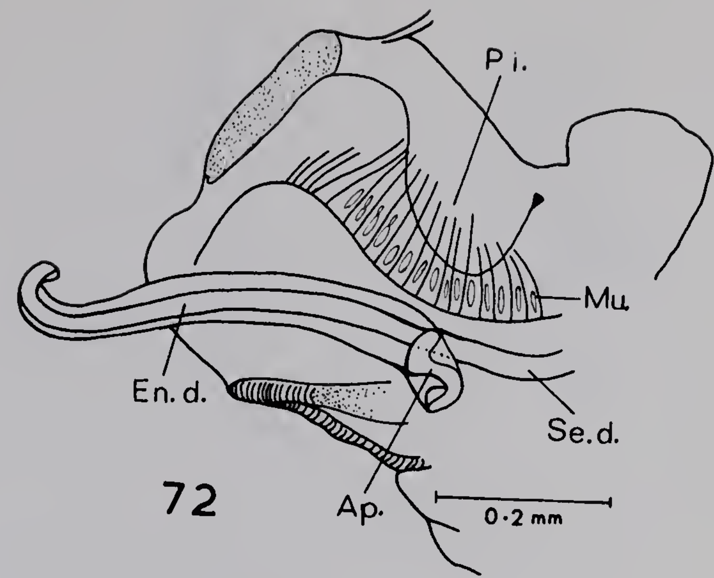

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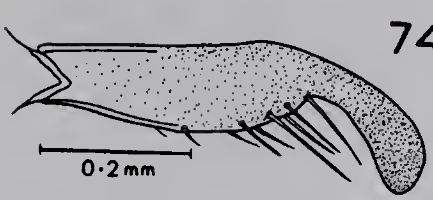

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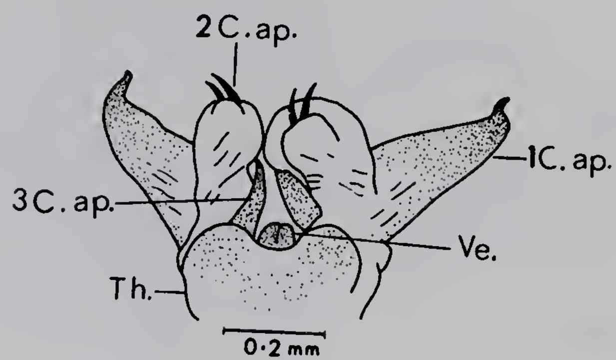

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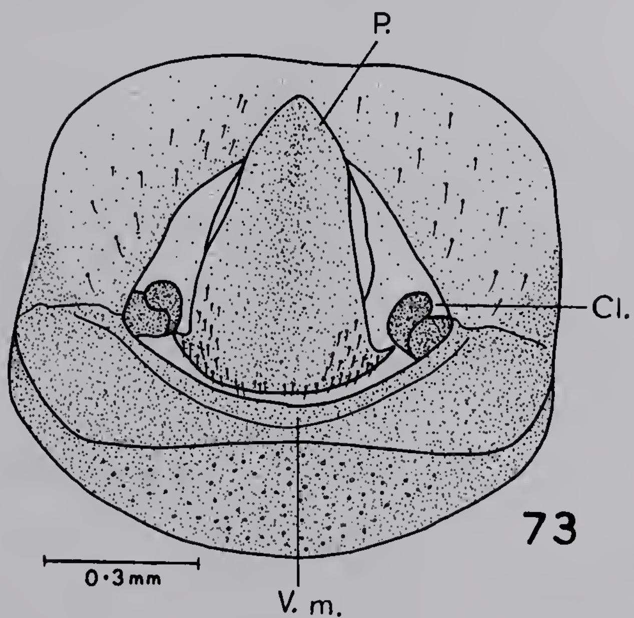

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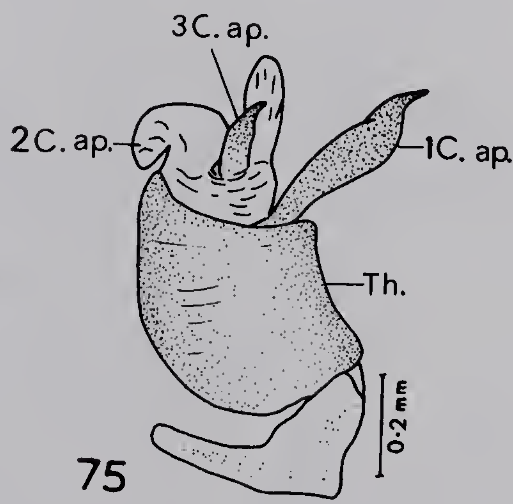

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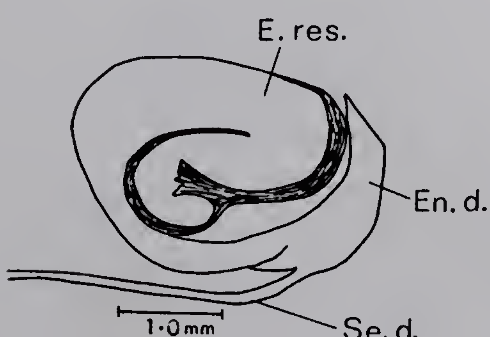

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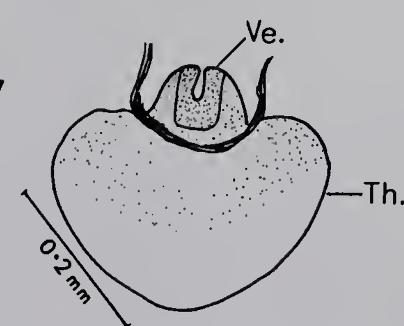

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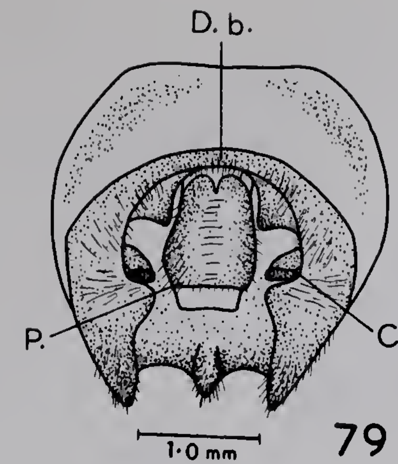
Figs. 79 - 83. Augocoris gomesii.

79, Pygophore, dorsal view; 80, clasper; 81, theca, lateral view; 82, conjunctival appendages, lateral view; 83, vesica, lateral view.

Figs. 84 - 89. Pentatoma rufipes.

84, pygophore, dorsal view; 85, ventral margin; 86, clasper; 87, aedoeagus, lateral view; 88, median penal lobes, ventral view; 89, vesica, lateral view.



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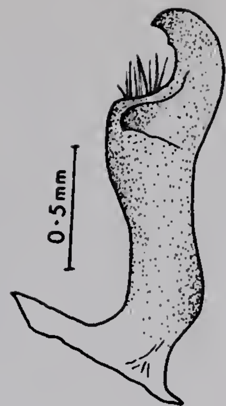

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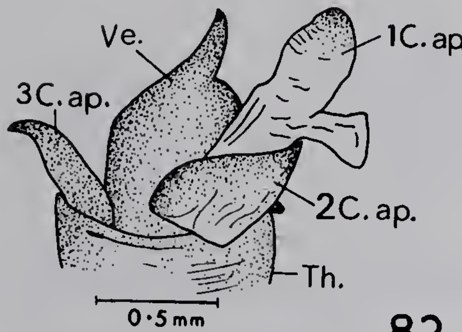

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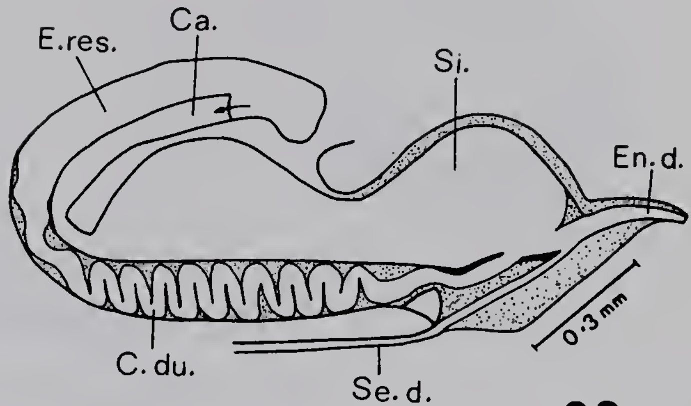

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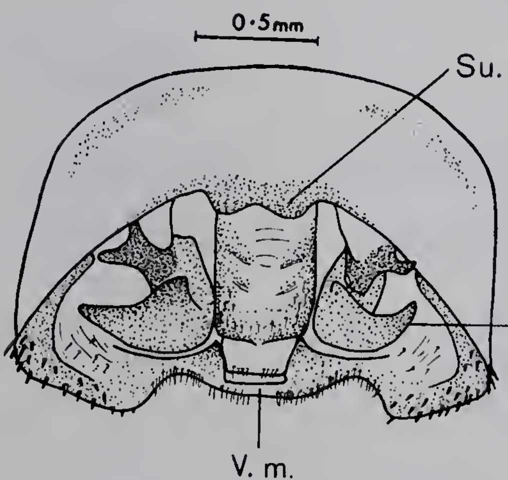

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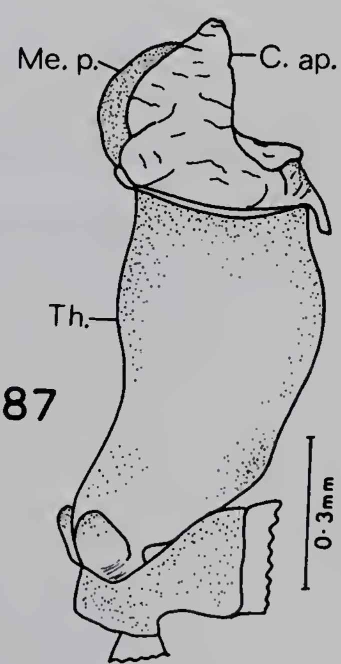

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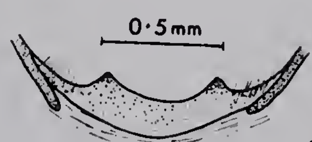

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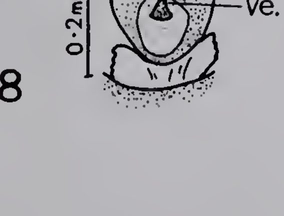

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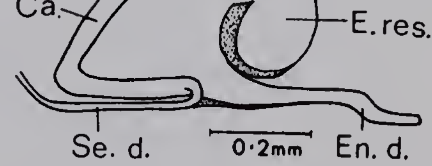


Figs. 90 - 95. _Dendrocoris humeralis_.

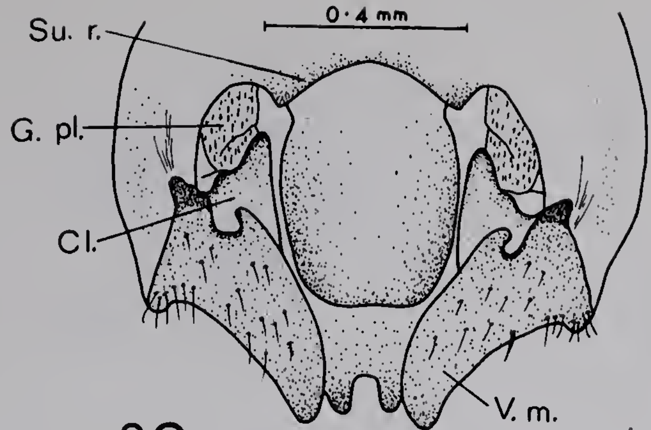
90, pygophore, dorsal view.

91, genital plate; 92, ventral margin; 93, clasper; 94, aedoeagus, lateral view; 95, vesica, lateral view.

Figs. 96 - 98. _Piezodorus lituratus_.

96, pygophore, dorsal view;

97, clasper; 98, aedoeagus, lateral view.



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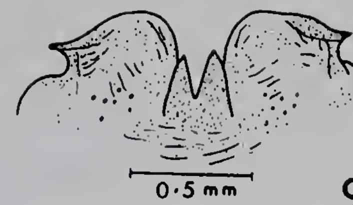

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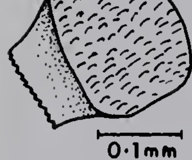

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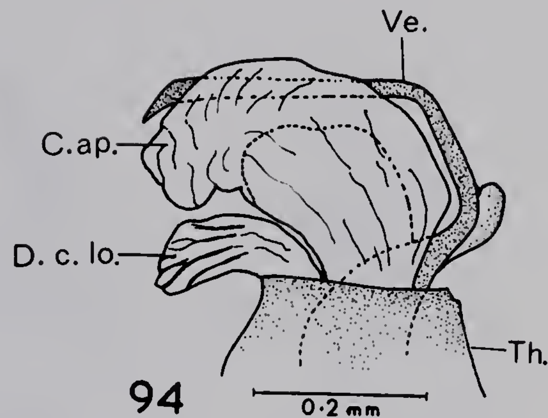

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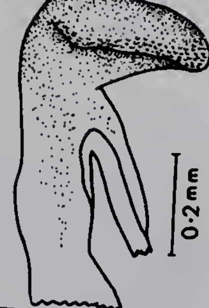

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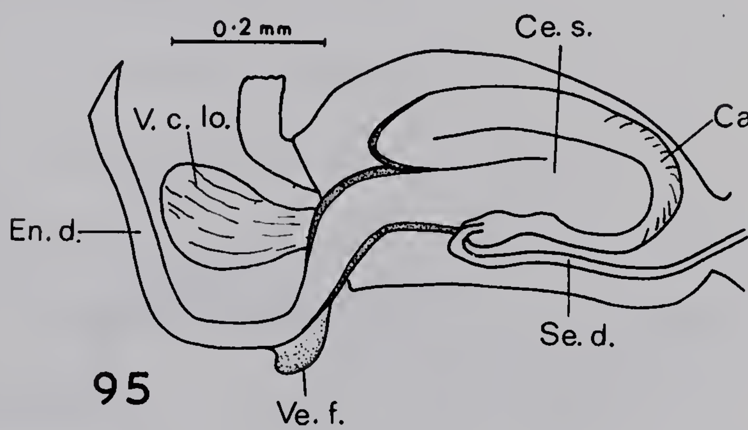

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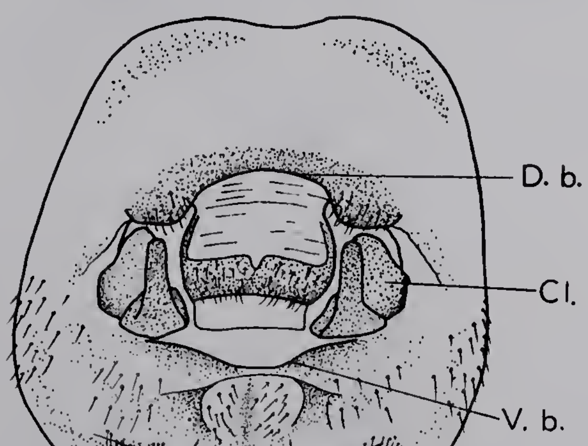

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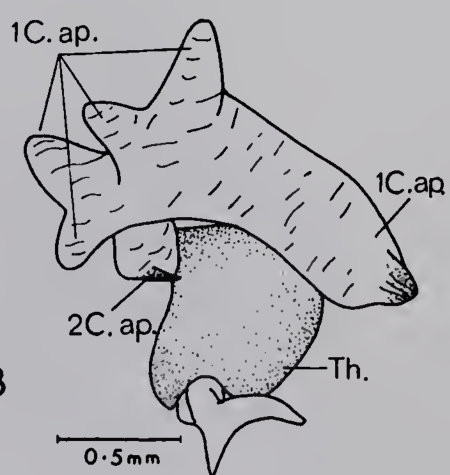

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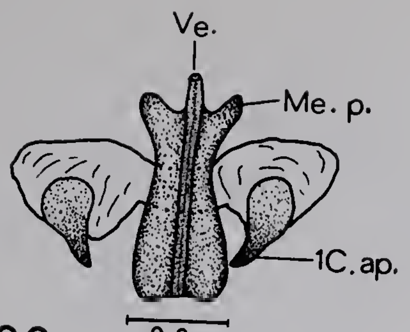
Figs. 99 - 100. _Piezodorus lituratus_.
99, median penal lobes, ventral view; 100, vesica, lateral view.

Figs. 101 - 105. _Solubea pugnax_.
101, pygophore, dorsal view; 102, clasper; 103, aedoeagus, lateral view; 104, median penal lobes, ventral view; 105, vesica, lateral view.

Figs. 106 - 107. _Peribalus limbolarius_.
106, pygophore, dorsal view; 107, clasper.



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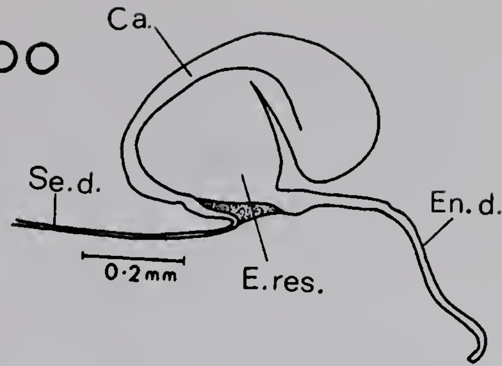

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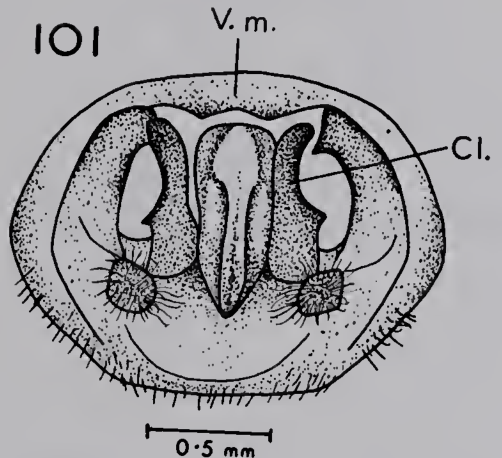

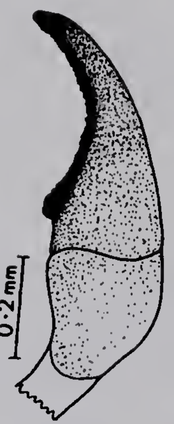

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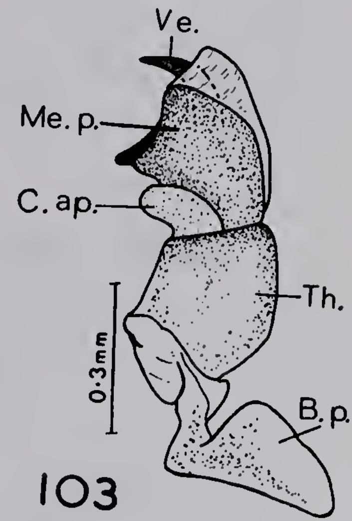

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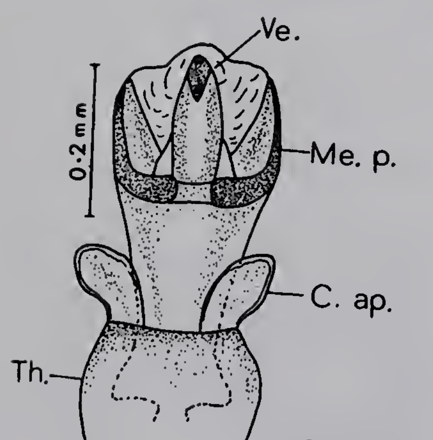

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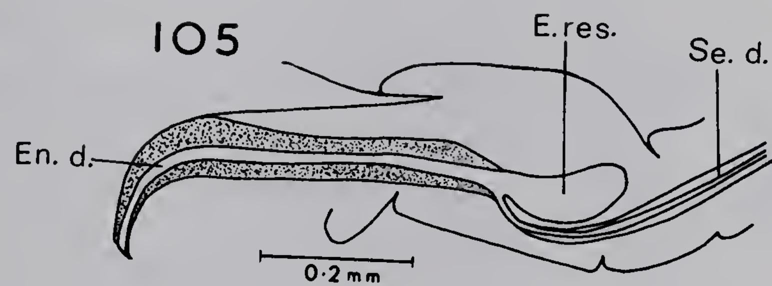

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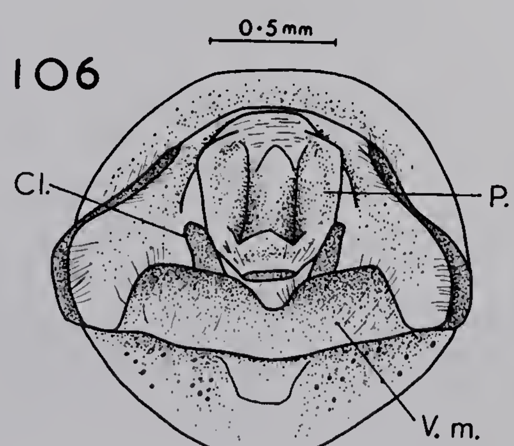
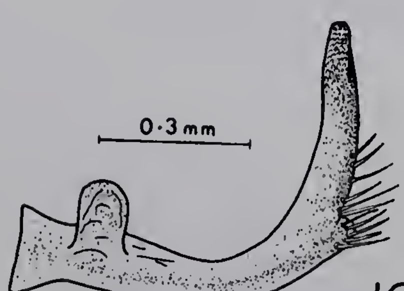




107

Figs. 108 - 110. Peribalus limbolarius.

108, aedoeagus, lateral view;

109, vesica, lateral view.

Figs. 111 - 114. Trichopepla semivittata.

111, pygophore, dorsal view;

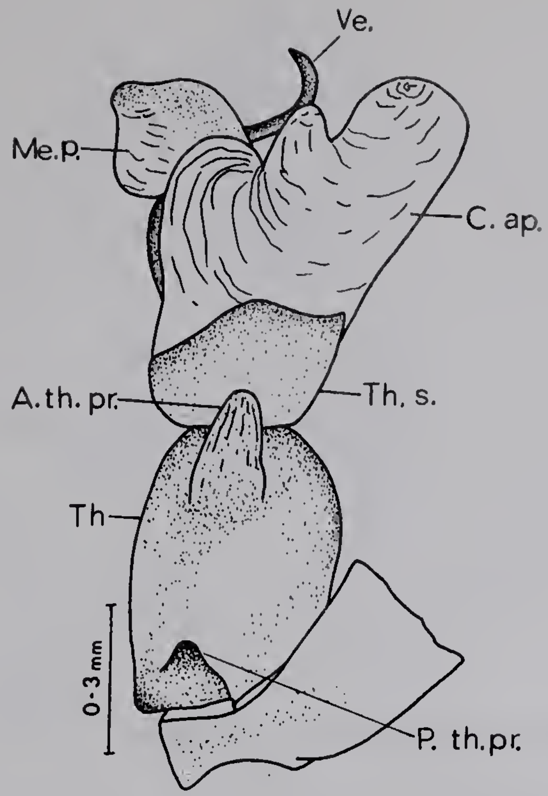
112, ventral border; 113, clasper;

114, vesica, lateral view.

Figs. 115 - 116. Mormidea lugens.

115, pygophore, dorsal view;

116, clasper.



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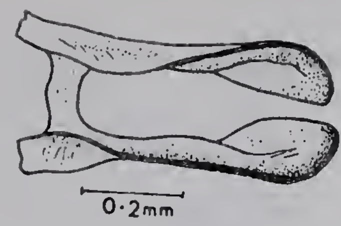

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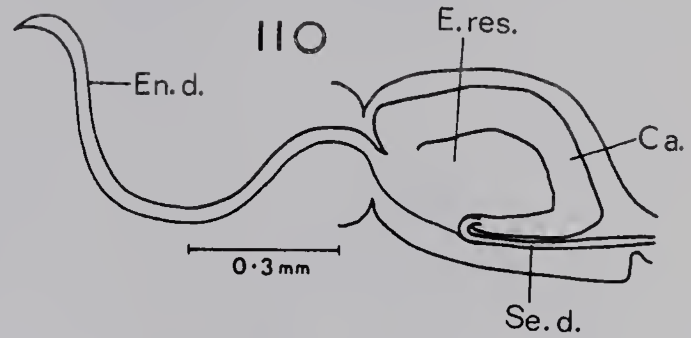

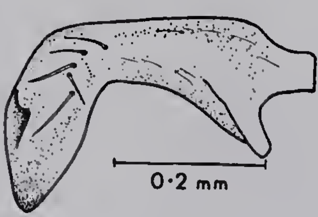

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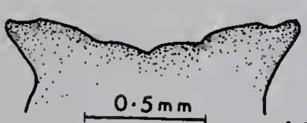

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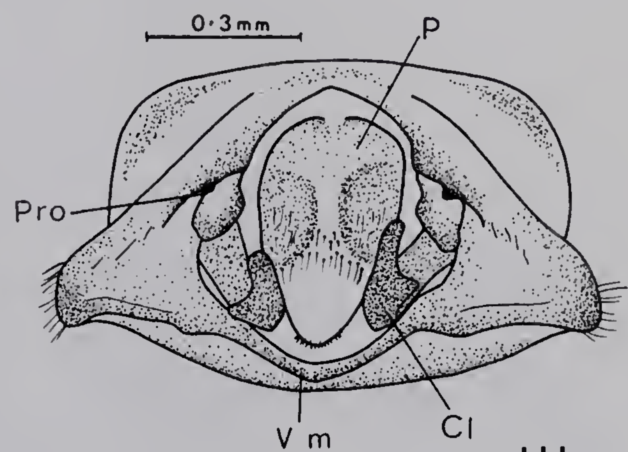

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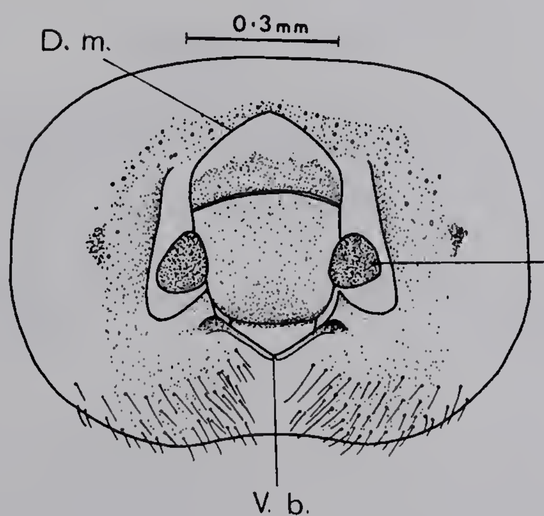

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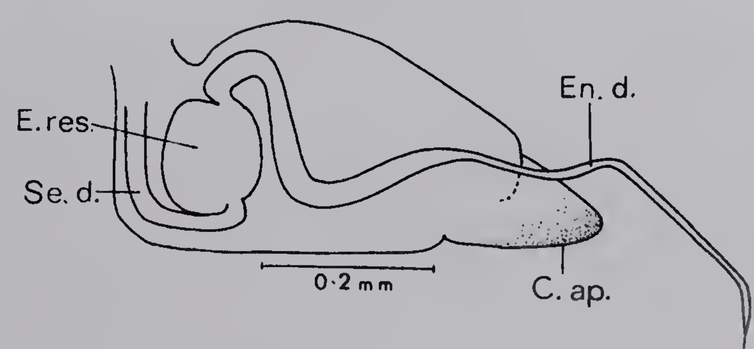
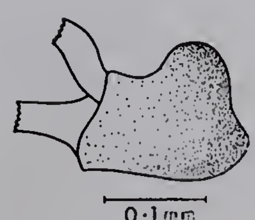




116

Figs. 117 - 118. Mormidea lugens.

117, aedoeagus, ventral view;

118, vesica, lateral view.

Figs. 119 - 123. Brepholoxa heidmanni.

119, pygophore, dorsal view;

120, clasper, inner view;

121, clasper, lateral view;

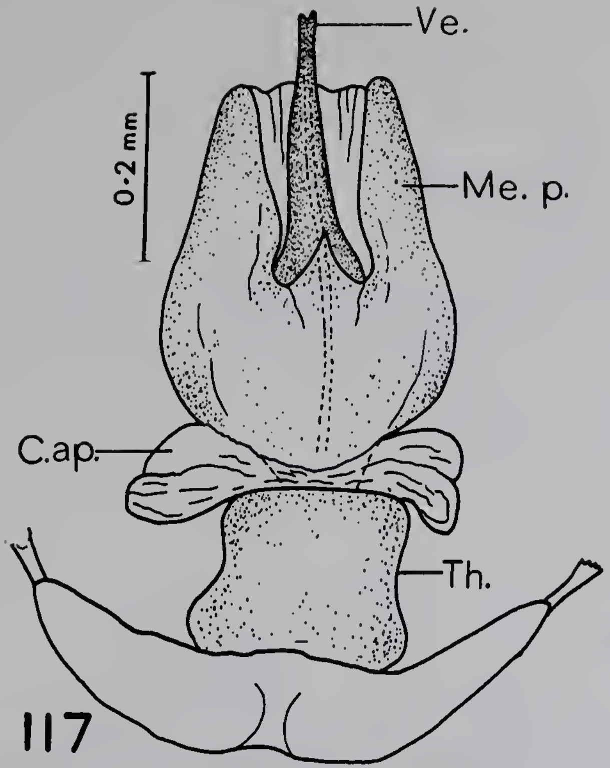
122, aedoeagus, lateral view;

123, vesica, lateral view.

Figs. 124 - 126. Arvelius albopunctatus.

124, pygophore, dorsal view;

125, lateral margin, inner view of left side.



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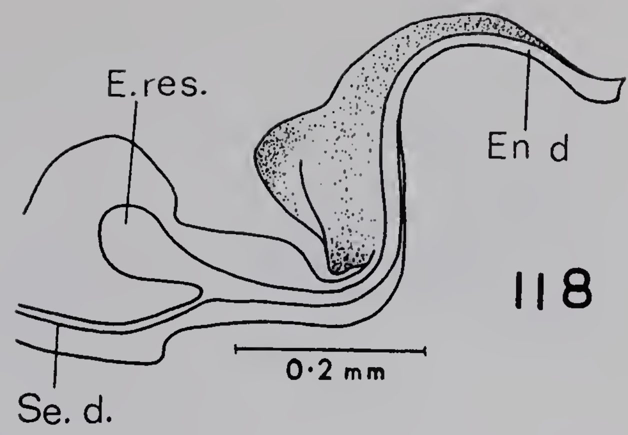

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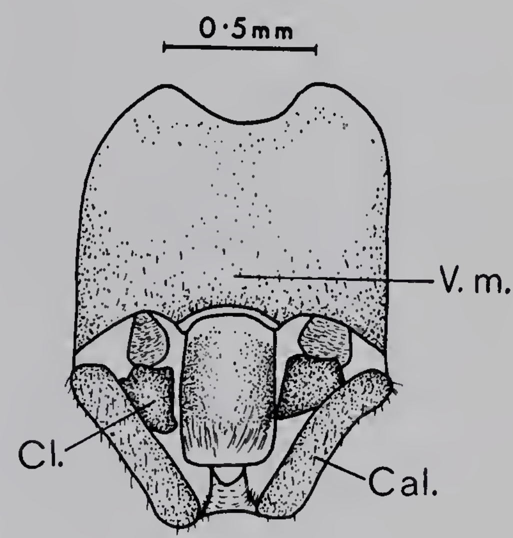

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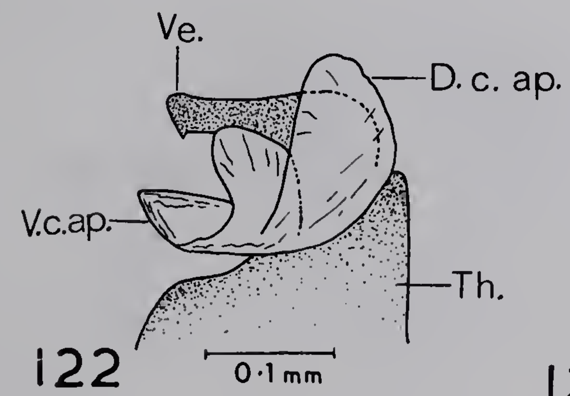

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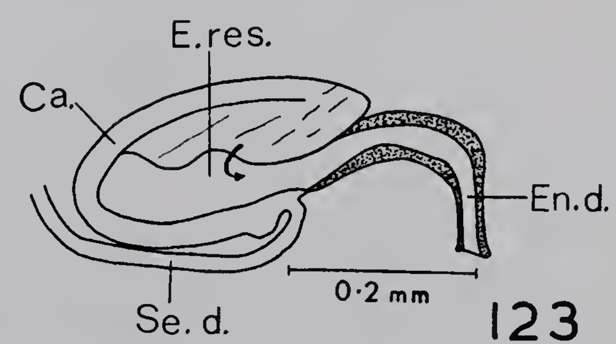

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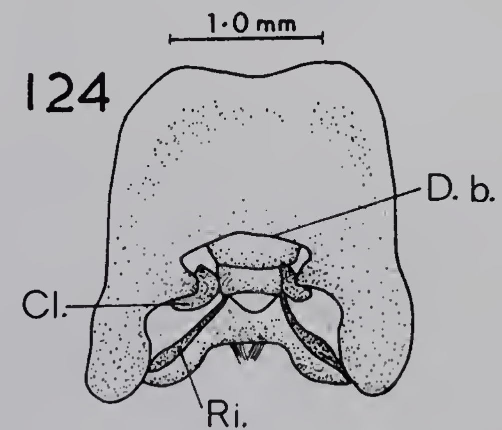

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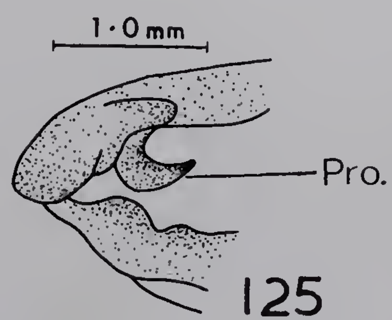

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Figs. 127 - 128. _Arvelius albopunctatus_.

127, aedoeagus, lateral view;

128, vesica, lateral view.

Figs. 129 - 133. _Aelia americana_.

129, pygophore, dorsal view.

130, clasper; 131, aedoeagus,

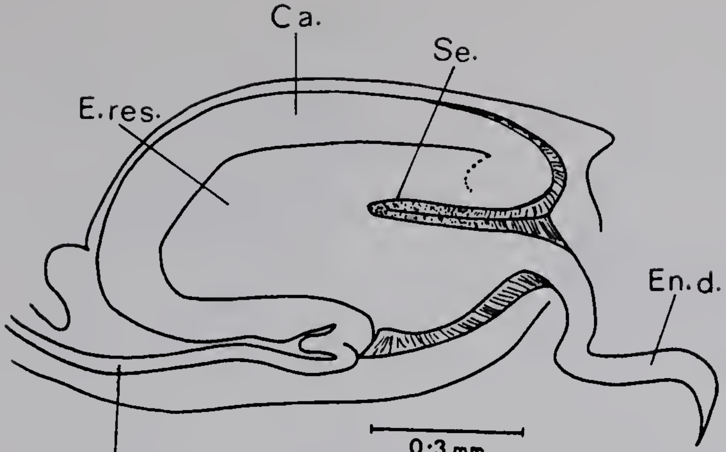
lateral view; 132, median penal lobes,

dorsal view; 133, vesica, lateral view.

Figs. 134 - 135. _Vulsirea violacea_.

134, pygophore, dorsal view;

135, clasper.



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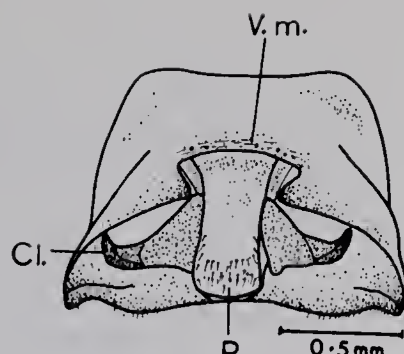

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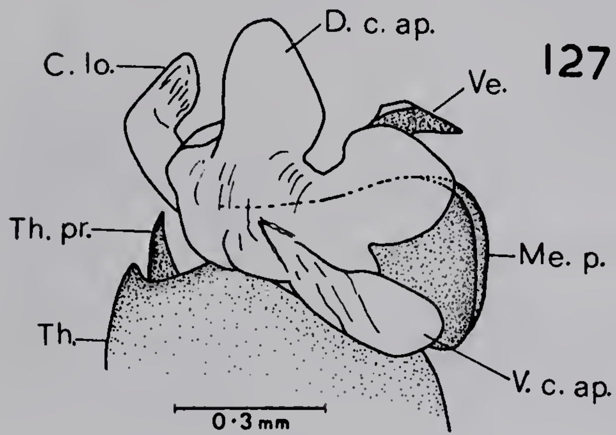

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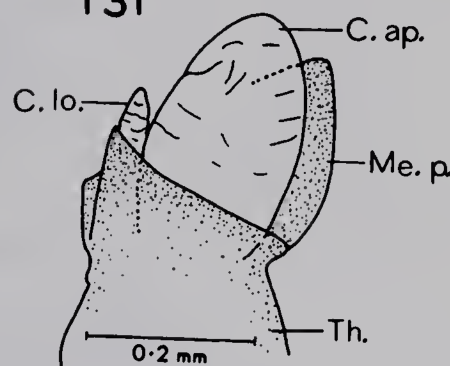

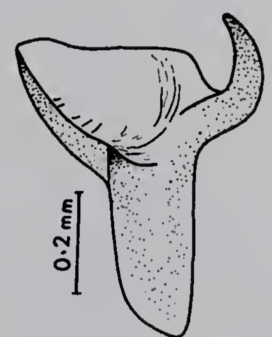

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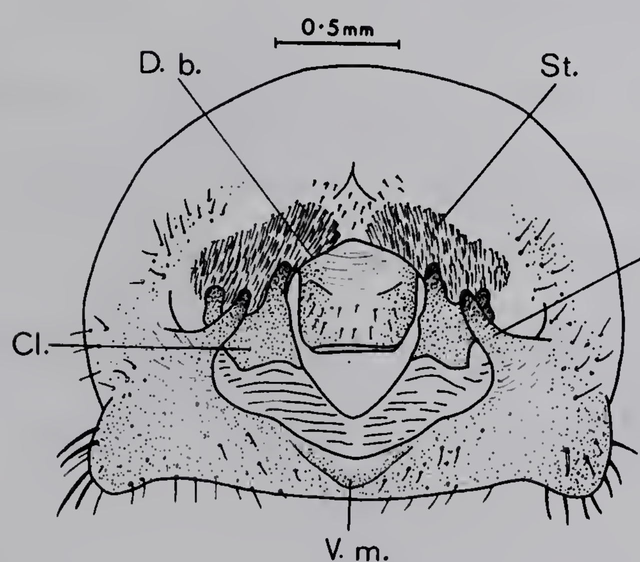

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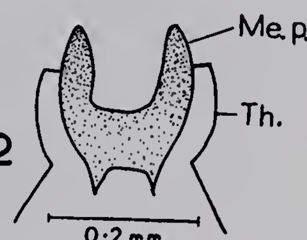

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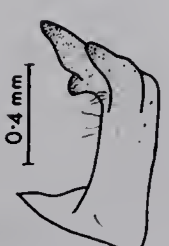

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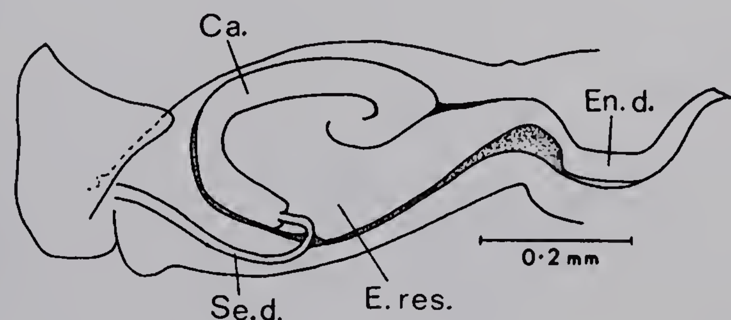


Figs. 136 - 138. _Vusirea violacea_.

136, aedoeagus, lateral view;
137, median penal lobes, doral view; 138, vesica, lateral view.

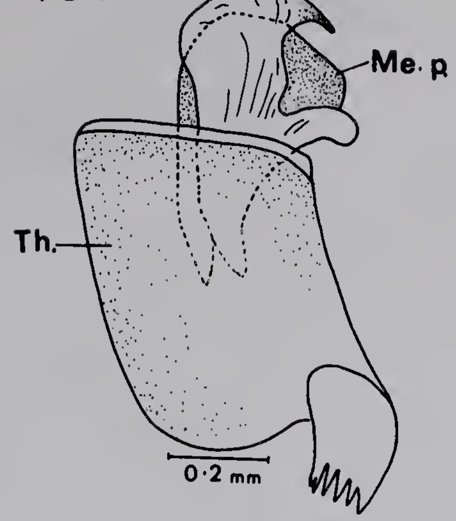
Figs. 139 - 143. _Acrosternum pensylvannicum_.

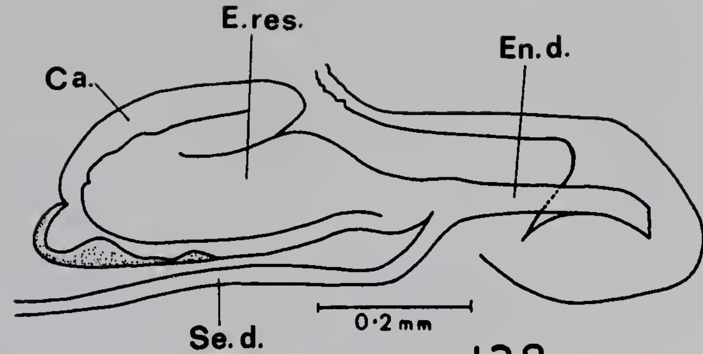
139, pygophore, dorsal view;
140, ventral border; 141, clasper;
142, aedoeagus, dorsal view;
143, vesica, lateral view.

Figs. 144 - 145. _Chlorocoris subrugosus_.

144, pygophore, dorsal view;
145, dorsal margin.

136





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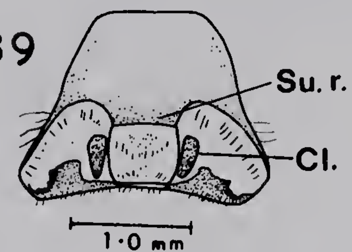

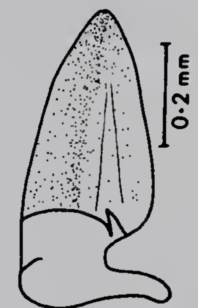

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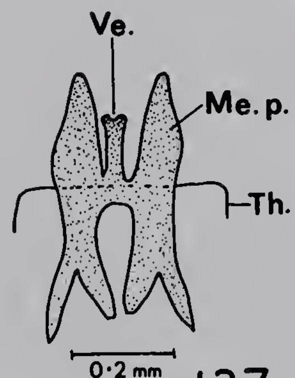

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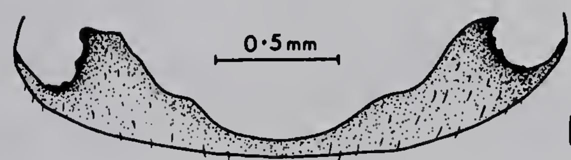

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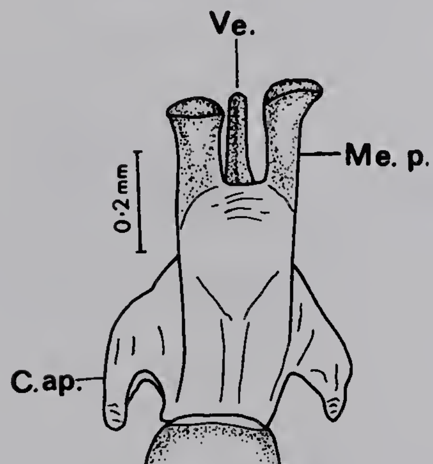

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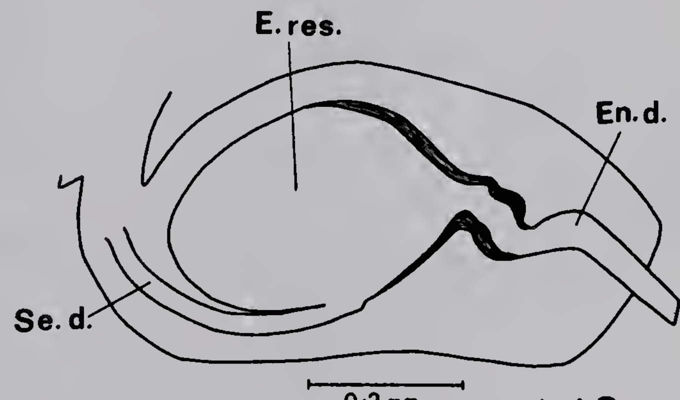

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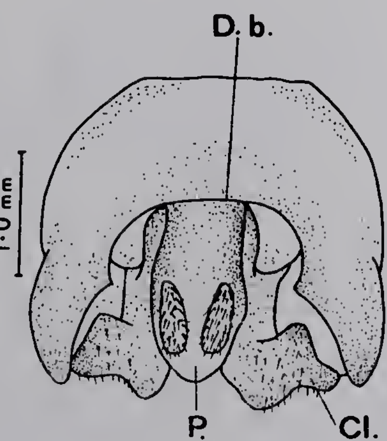

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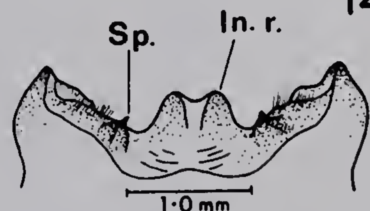
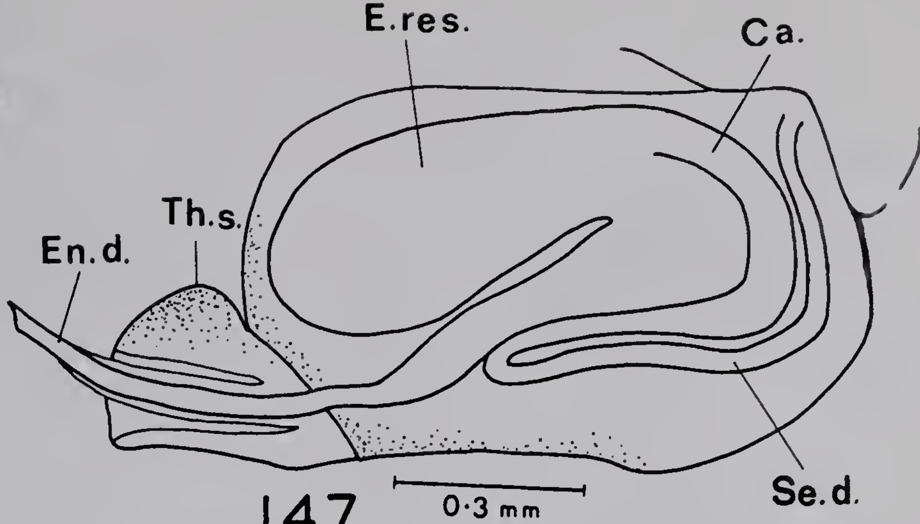


Figs. 146 - 147. *Chlorocoris subrugosus*.
146, clasper; 147, vesica, lateral view.

Figs. 148 - 153. *Carpocoris remotus*.
148, pygophore, dorsal view; 149, genital plate; 150, ventral border; 151, clasper; 152, aedoeagus, lateral view; 153, conjunctival appendages, dorsal view.

146



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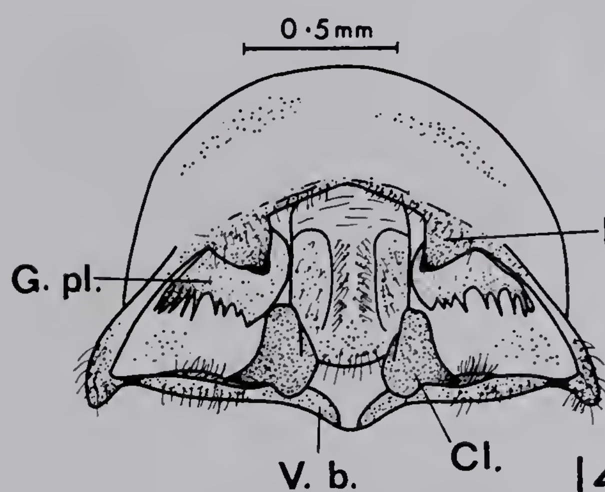

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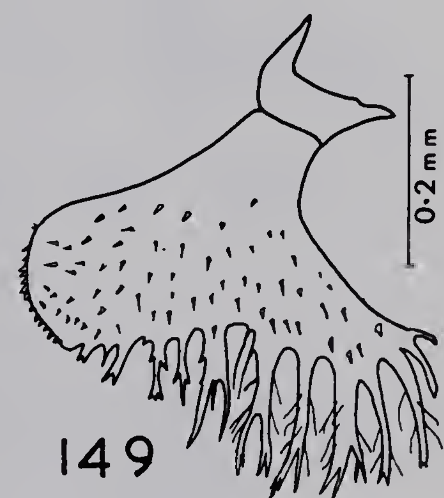

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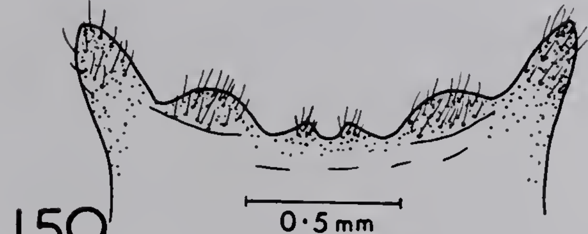

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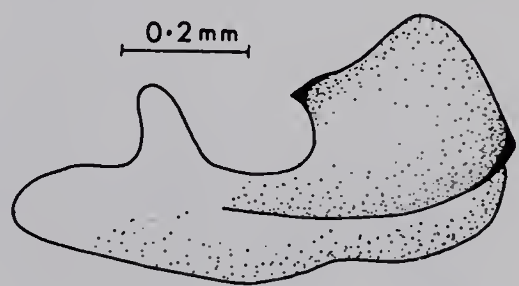

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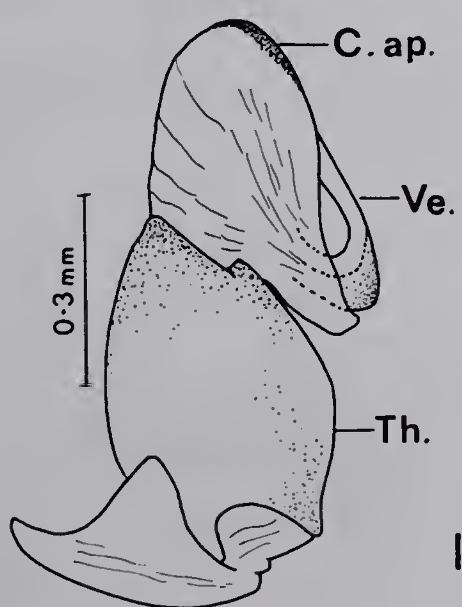

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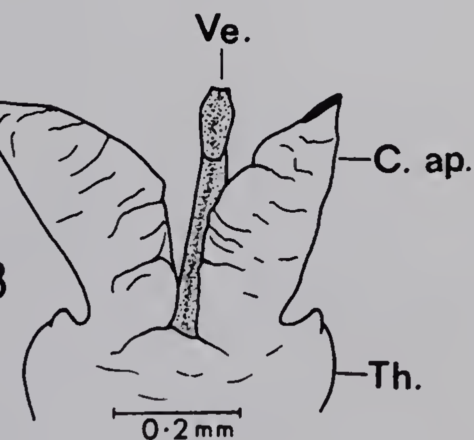

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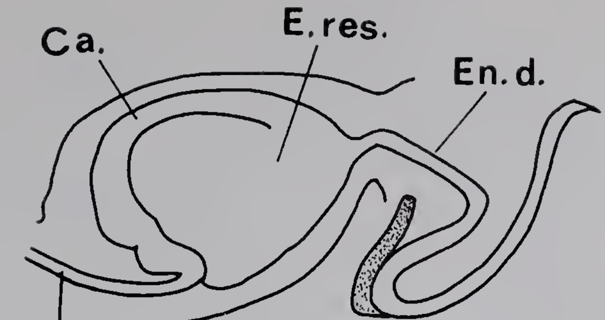
Fig. 154. _Carpocoris_ _remotus_, vesica, lateral view.

Figs. 155 - 160. _Nezara_ _viridula_.

155, pygophore, dorsal view; 156, ventral border; 157, clasper; 158, aedoeagus, lateral view; 159, median penal lobes, ventral view; 160, vesica, lateral view.

Figs. 161 - 163. _Thyanta_ _perditor_.

161, pygophore, dorsal view; 162, clasper; 163, aedoeagus, lateral view.



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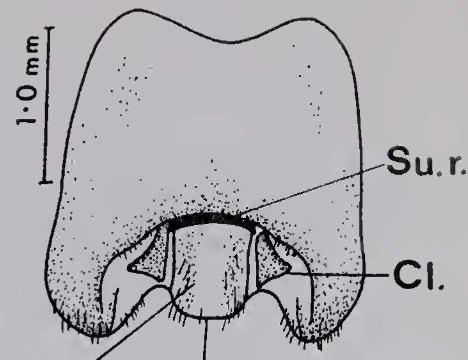

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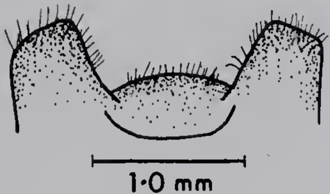

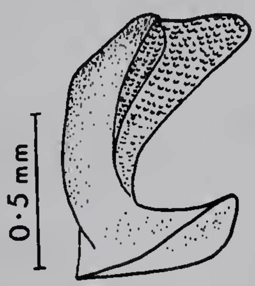

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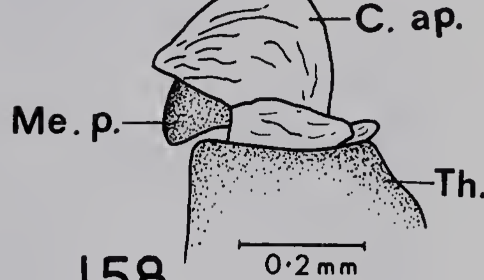

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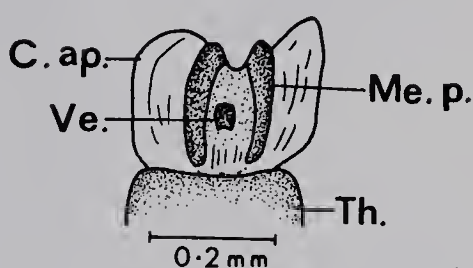

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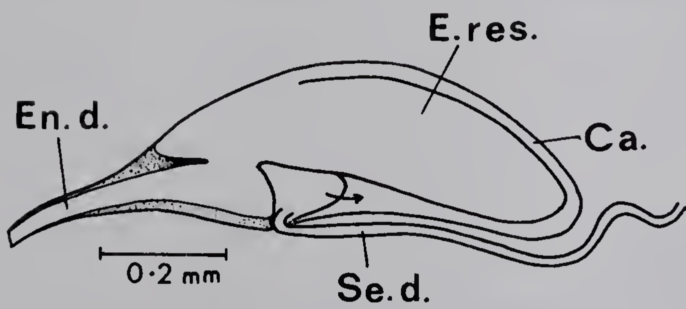

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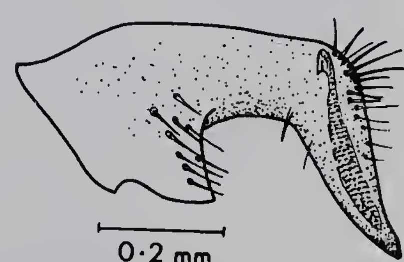

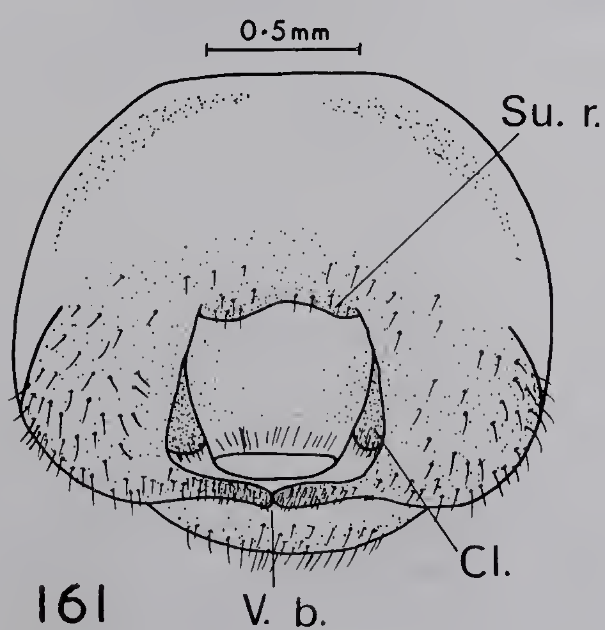

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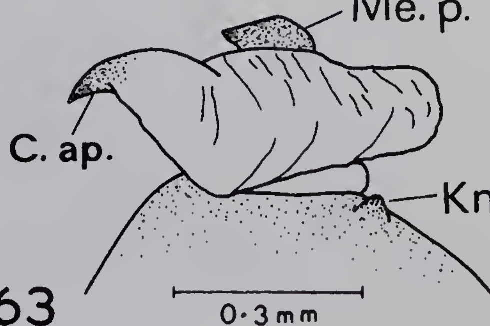

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Figs. 164 - 165. *Thyanta perditor*.

164, median penal lobes, dorsal view

165, vesica, lateral view.

Figs. 166 - 172. *Padaeus viduus*.

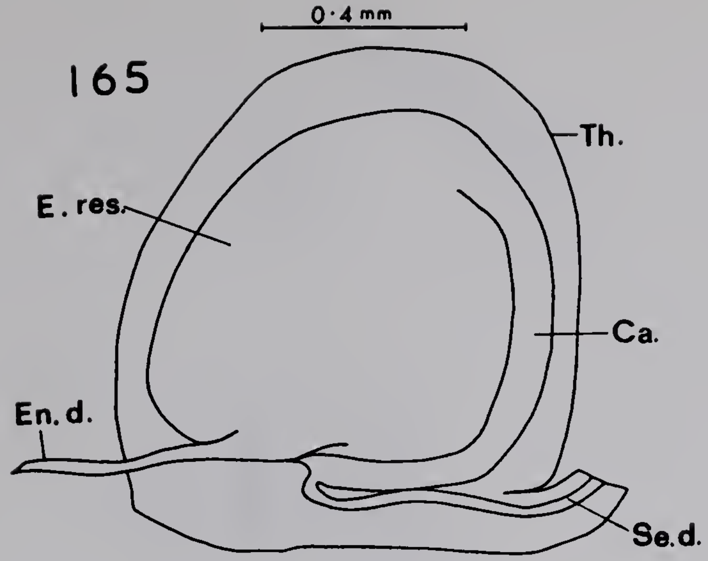
166, pygophore, dorsal view;

167, clasper; 168, theca, lateral view; 169, aedoeagus, lateral view; 170, median penal lobes, dorsal view; 171, median penal lobes, ventral view; 172, vesica, lateral view.

Fig. 173 - 174. *Proxys punctulatus*.

173, pygophore, dorsal view;

174, ventral border.



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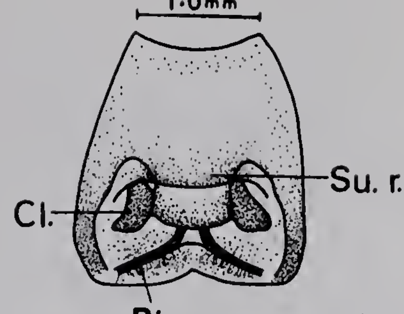

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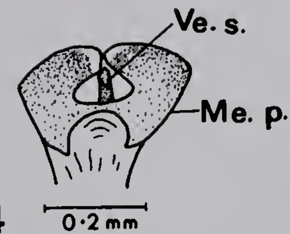

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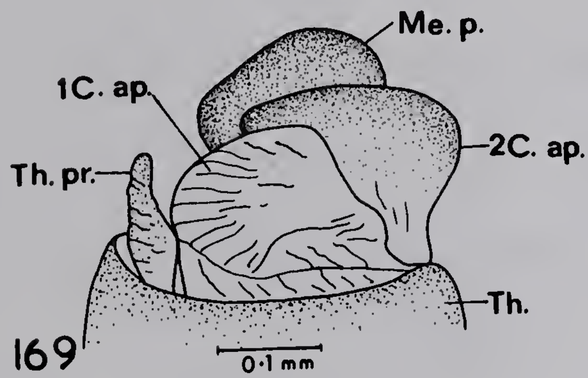

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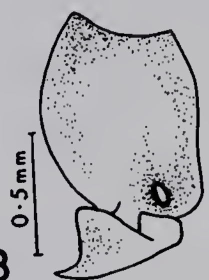

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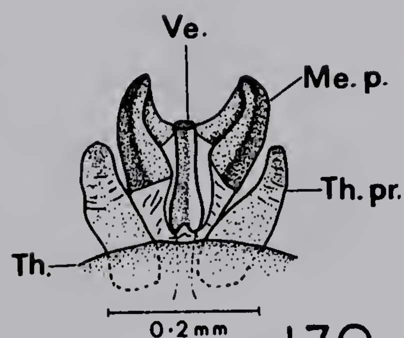

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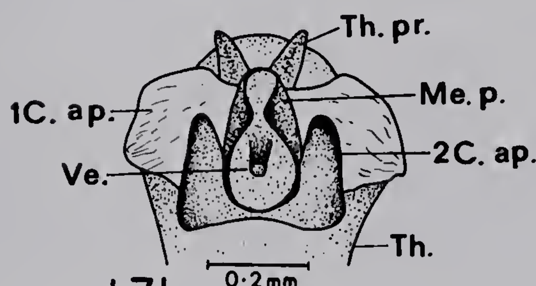

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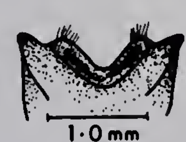

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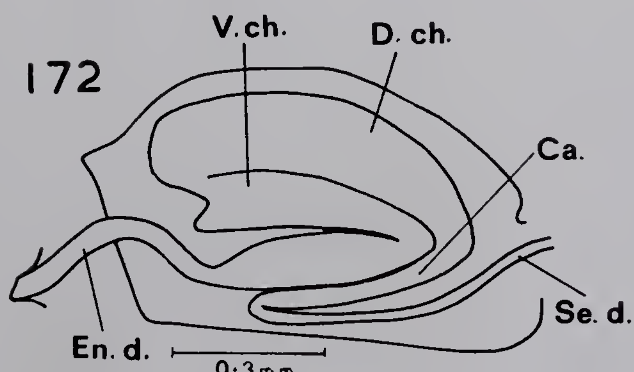
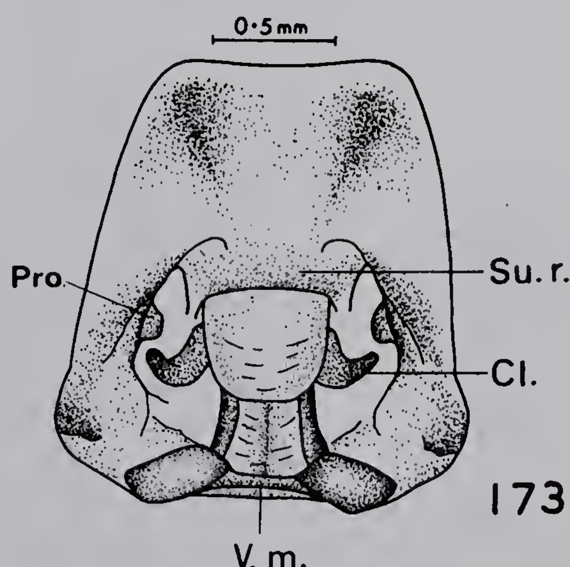




173

Figs. 175 - 176. *Proxys punctulatus.*

175, clasper; 176, aedoeagus, apical view.

Figs. 177 - 180. *Neottiglossa trilineata.*

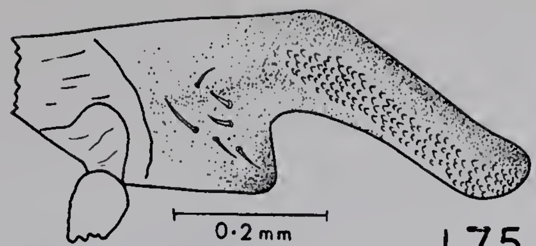
177, pygophore, dorsal view;

178, clasper; 179 aedoeagus, ventral view; 180, vesica, lateral view.

Figs. 181 - 184. *Murgantia histrionica.*

181, pygophore, dorsal view;

182, clasper; 183, aedoeagus, lateral view; 184, median penal lobes, ventral view.



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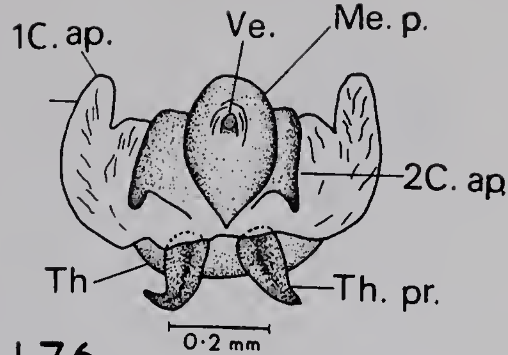

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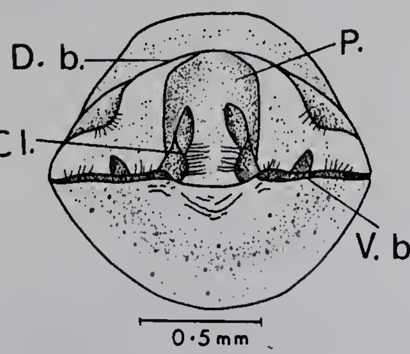

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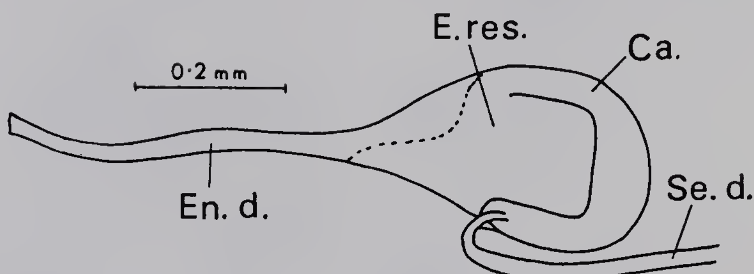

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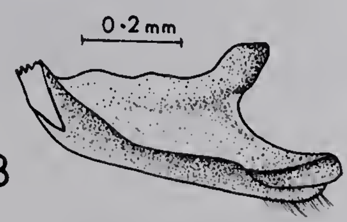

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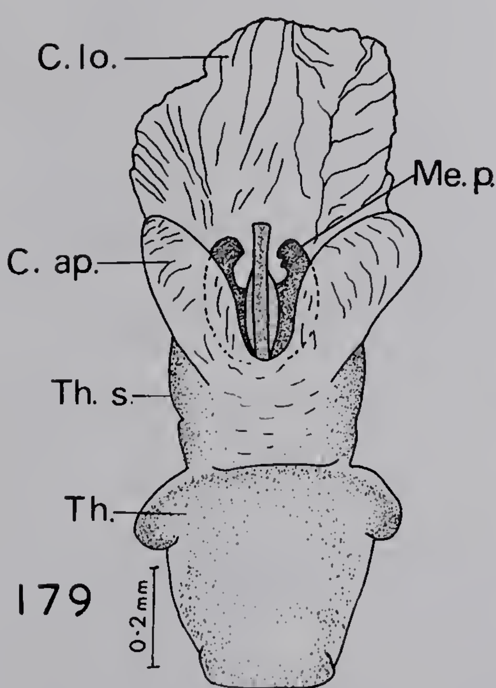

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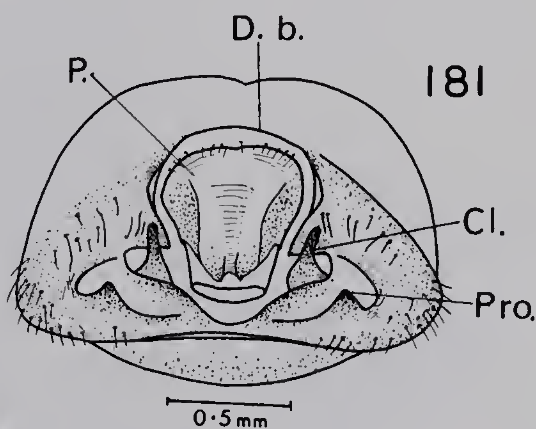

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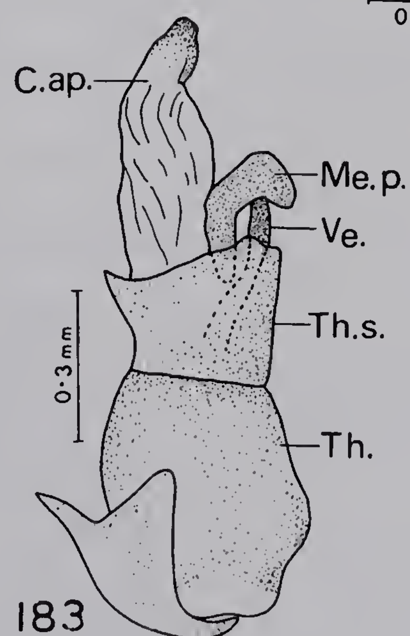

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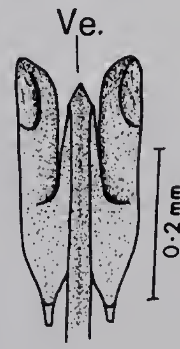

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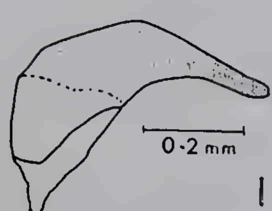

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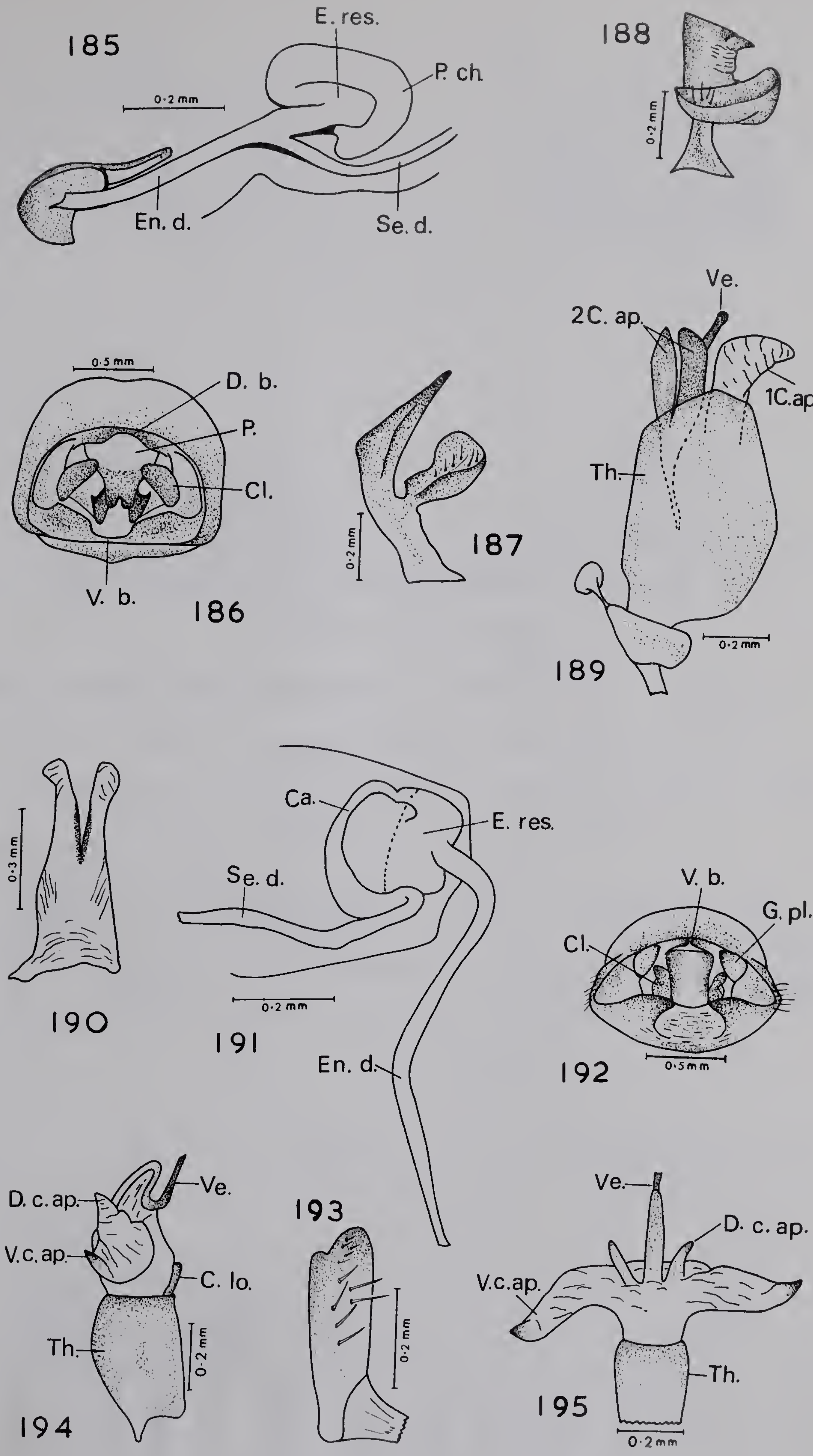
Fig. 185. *Murgantia histrionica*; vesica, lateral view.

Figs. 186 - 191. *Eysarcoris aeneus*. 186, pygophore, dorsal view; 187, clasper, lateral view; 188, clasper, inner view; 189, aedoeagus, lateral view; 190, first conjunctival appendages, ventral view; 191, vesica, lateral view.

Figs. 192 - 195. *Eysarcoris intergressus*. 192, pygophore, dorsal view; 193, clasper; 194, aedoeagus, lateral view; 195, conjunctival appendages, dorsal view.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E. res.
P. ch.
0·2 mm
En. d.
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188
0·2 mm
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0·5 mm
D. b.
P.
Cl.
V. b.
186
0·2 mm
187
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E. res.
Se. d.
0·2 mm
191
En. d.
V. b.
G. pl.
Cl.
0·5 mm
192
D. c. ap.
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V. c. ap.
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Th.
0·2 mm
194
193
0·2 mm
Ve.
D. c. ap.
V. c. ap.
Th.
195
0·2 mm

Fig. 196. _Eysarcoris intergressus_; vesica, lateral view.

Figs. 197 - 200. _Cosmopepla bimaculata_.

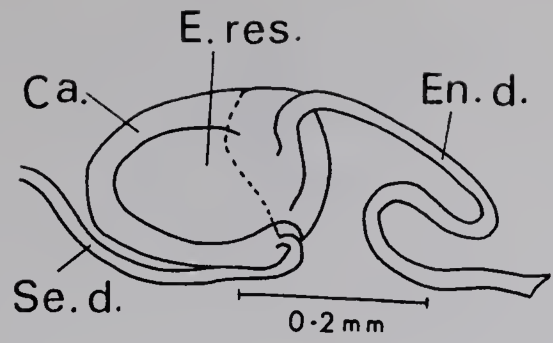
197, pygophore, dorsal view.

198, clasper; 199, aedoeagus, lateral view; 200, vesica, lateral view.

Figs. 201 - 203. Rhytidolomia senilis.

201, pygophore, dorsal view;

202, clasper; 203, aedoeagus, lateral view.



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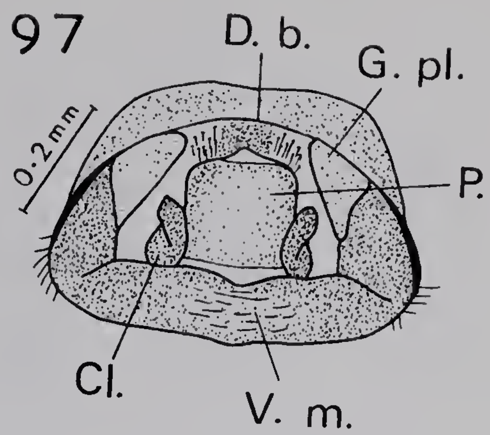

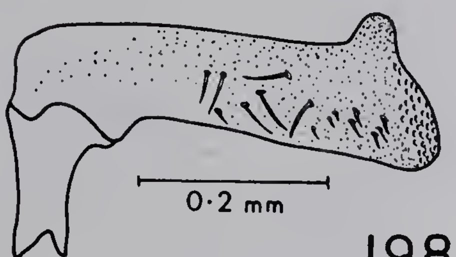

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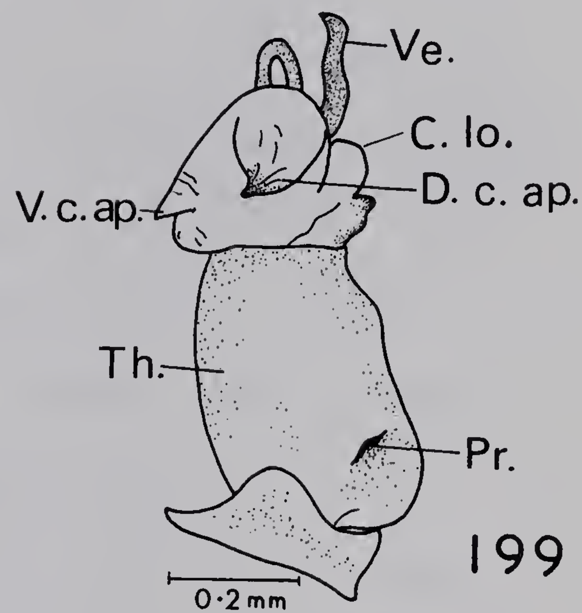

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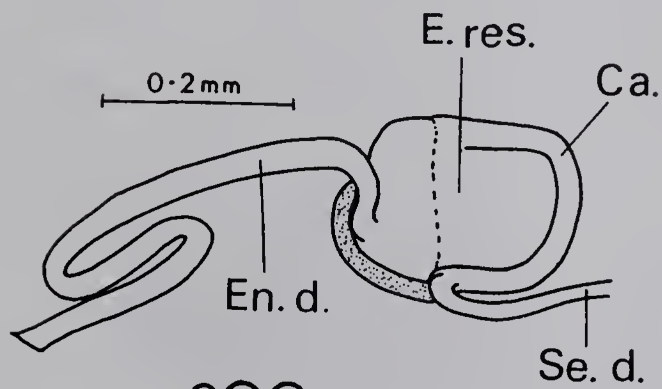

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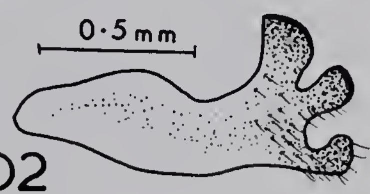

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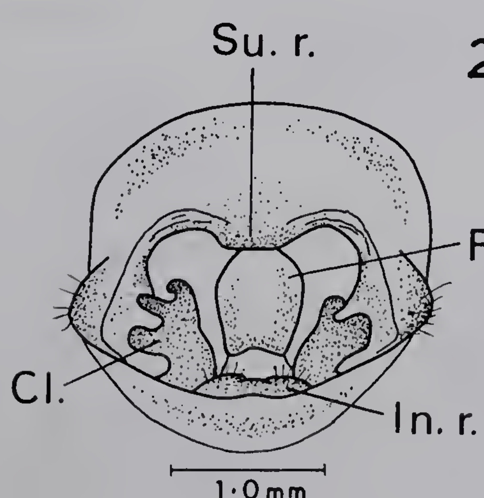

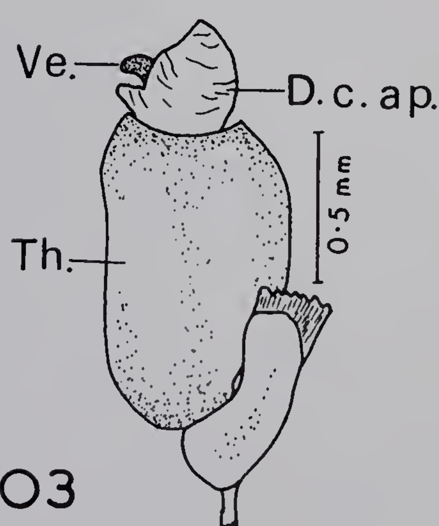

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Figs. 204 - 205. *Rhytidolomia senilis*.

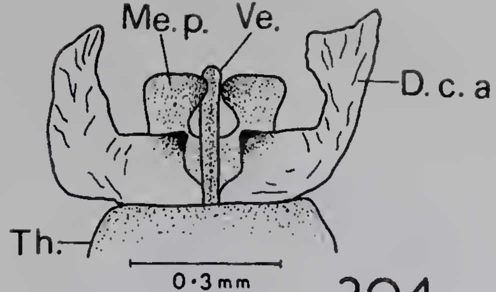
204, aedoeagus, lateral view;
205, vesica, lateral view.

Figs. 206 - 209. *Rhytidolomia viridicata*.

206, pygophore, dorsal view;
207, clasper, inner view; 208, clasper, lateral view; 209, aedoeagus, lateral view.

Figs. 210 - 214. *Rhytidolomia saucia*.

210, ventral border of pygophore;
211, pygophore, dorsal view; 212, clasper; 213, aedoeagus, lateral view; 214, median penal lobes, ventral view.



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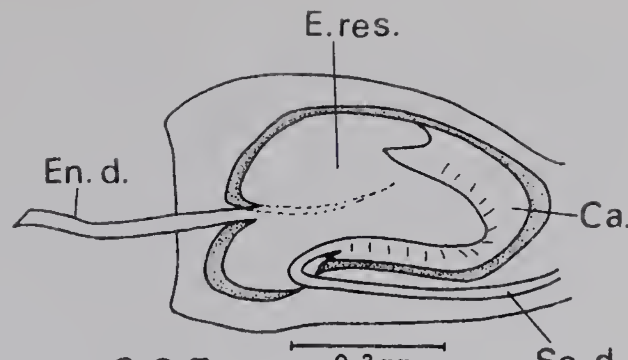

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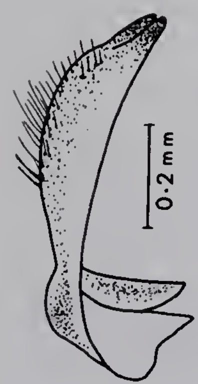

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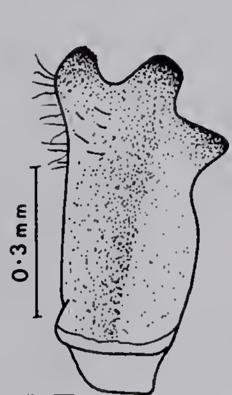

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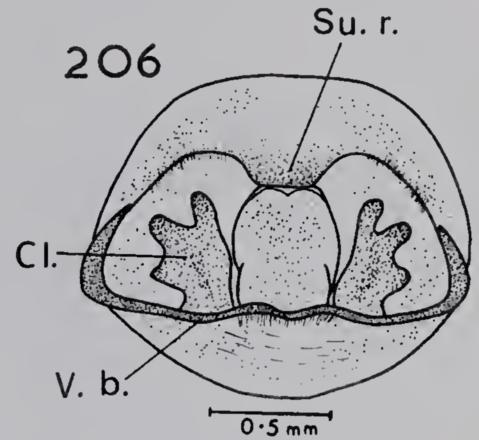

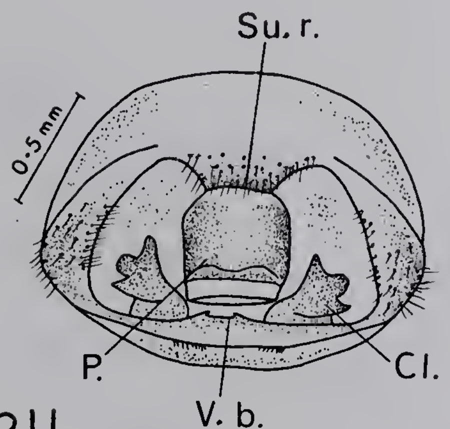

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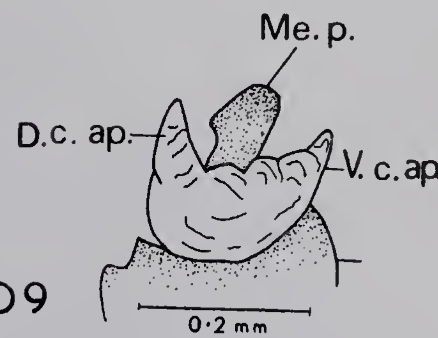

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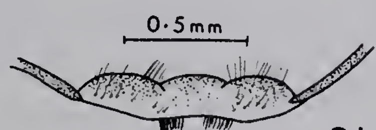

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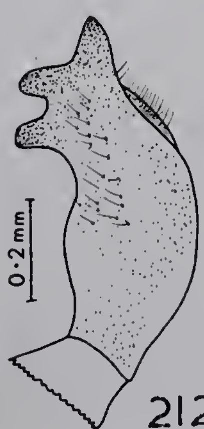

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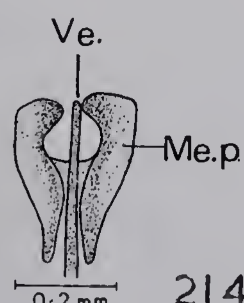

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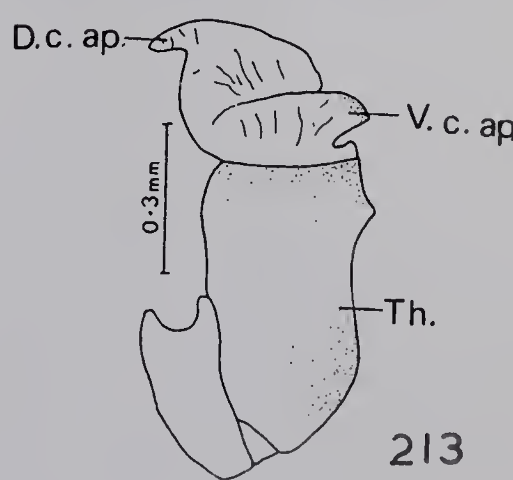

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Figs. 215 - 216. *Chlorochroa ligata*.

215, pygophore, dorsal view,

216, clasper.

Figs. 217 - 218. *Chlorochroa uhleri*.

217, pygophore, dorsal view;

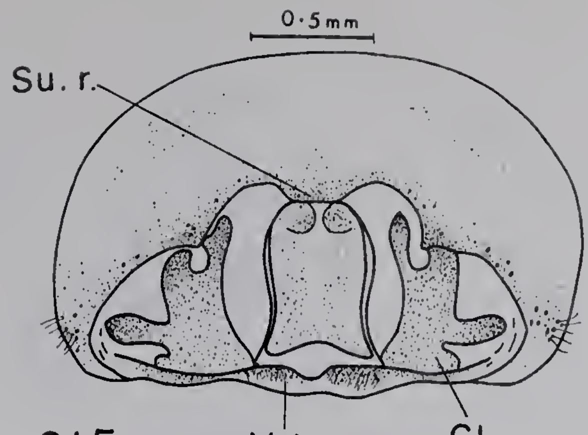
218, clasper.

Fig. 219. *Chlorochroa sayi*, clasper.

Figs. 220 - 223. *Banasa dimidiata*.

220, pygophore, dorsal view;

221, clasper; 222, aedoeagus, lateral view; 223, vesica, lateral view.



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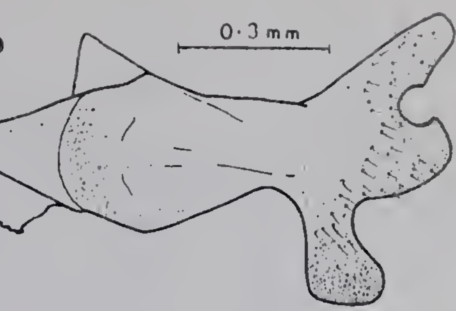

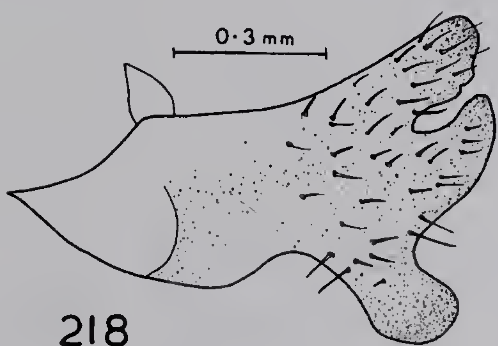

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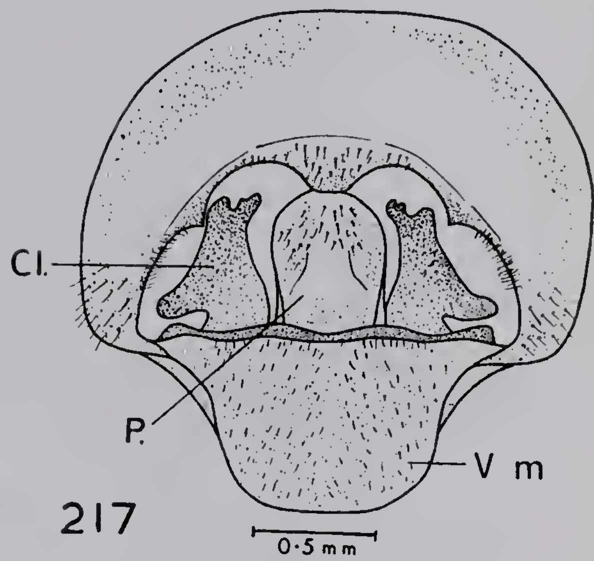

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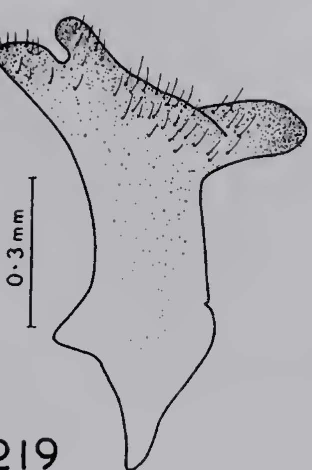

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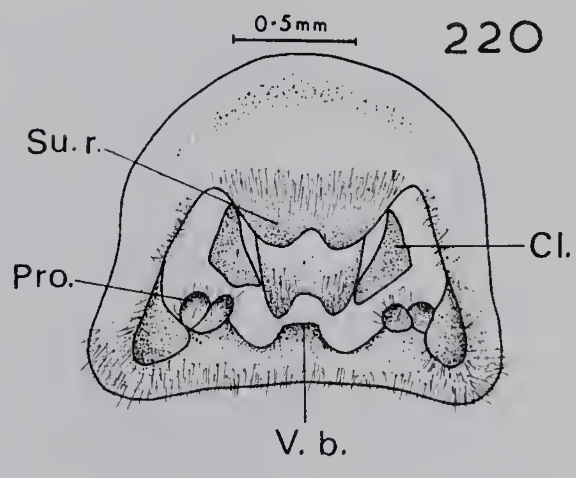

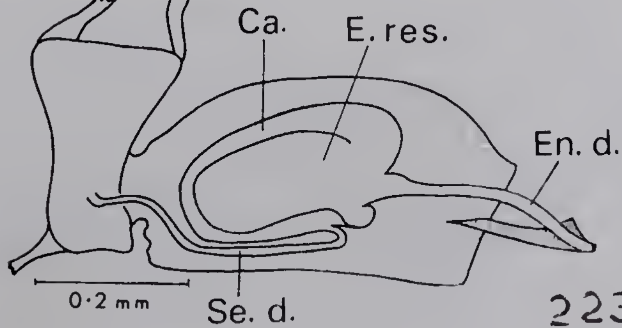

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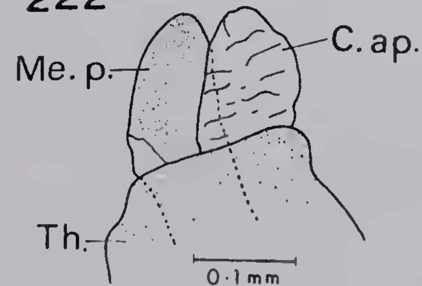


Figs. 224 - 229. *Loxa flavicollis*.

224, pygophore, dorsal view;

225, ventral border; 226, clasper;

227, aedoeagus, lateral view;

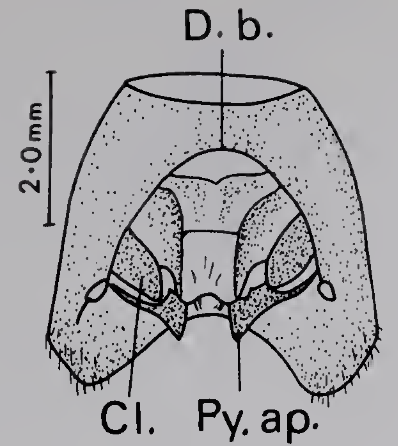
228, aedoeagus, ventral view;

229, vesica, lateral view.

Figs. 230 - 231. *Menecles insertus*.

230, pygophore, dorsal view;

231, ventral border.



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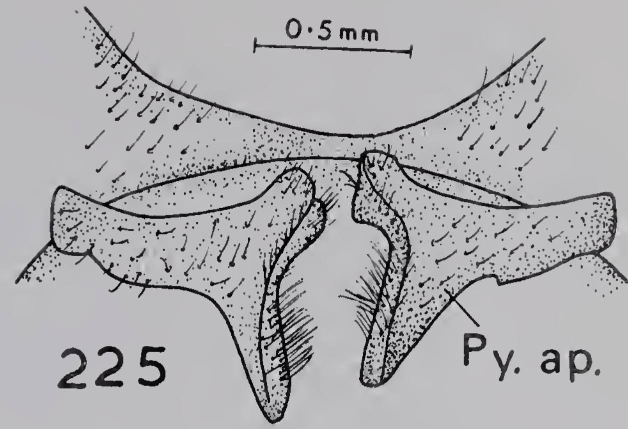

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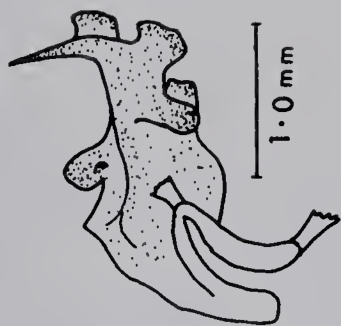

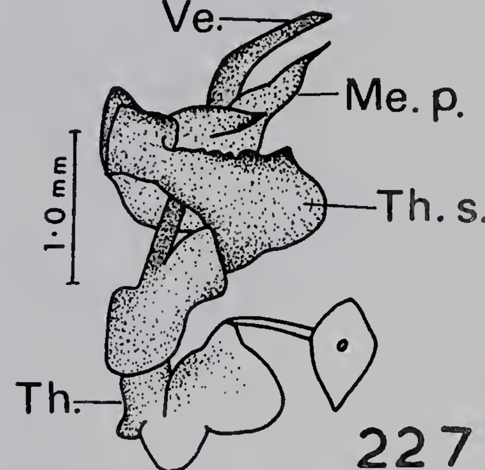

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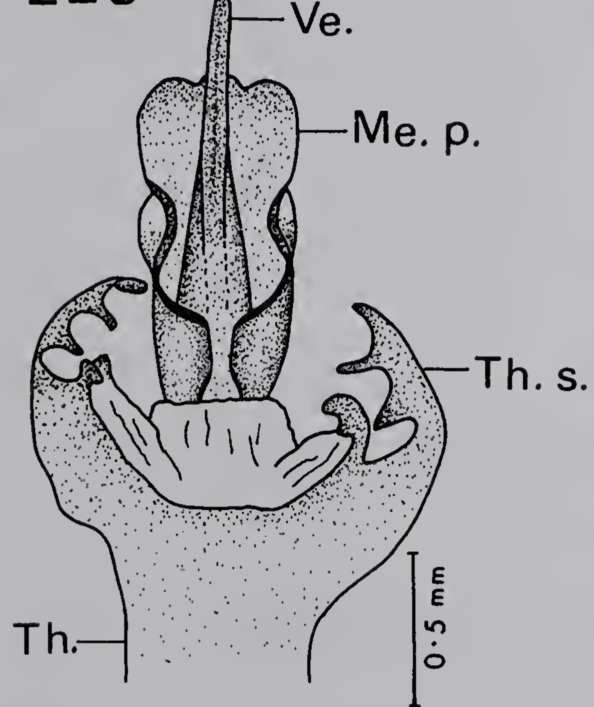

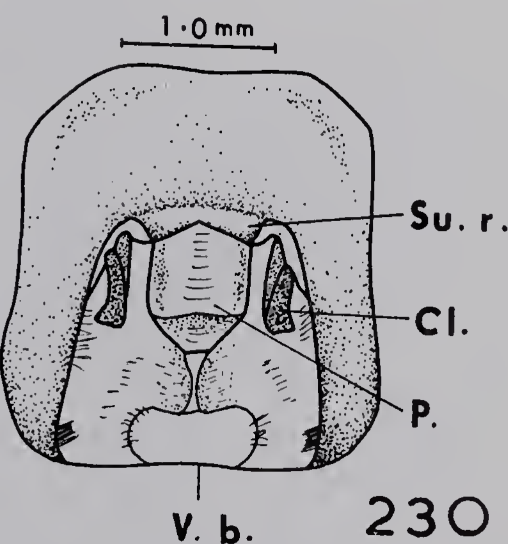

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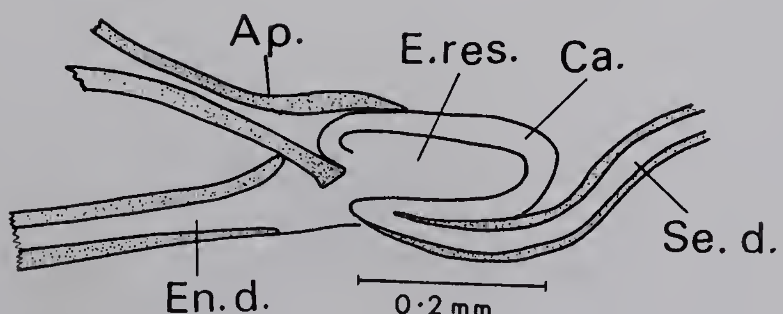

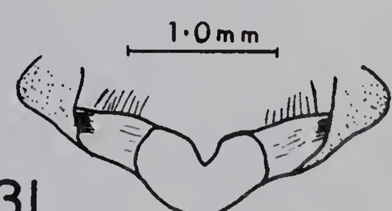

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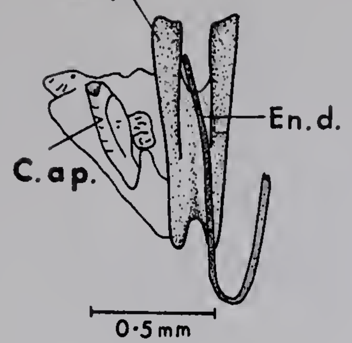
Figs. 232 - 236. _Menecles insertus_.

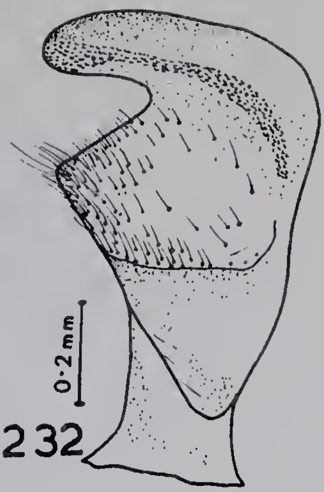
232, clasper; 233, aedoeagus, lateral view; 234, thecal processes, dorsal view; 235, median penal lobes, ventral view; 236, vesica, lateral view.

Figs. 237 - 239. _Coenus delius_.

237, pygophore, dorsal view; 238, clasper; 239, aedoeagus, lateral view.

235





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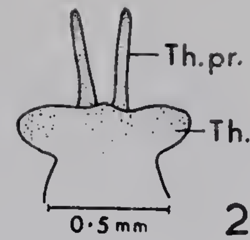

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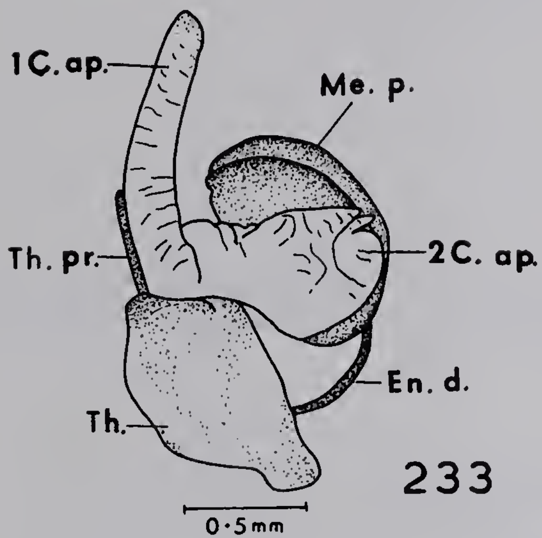

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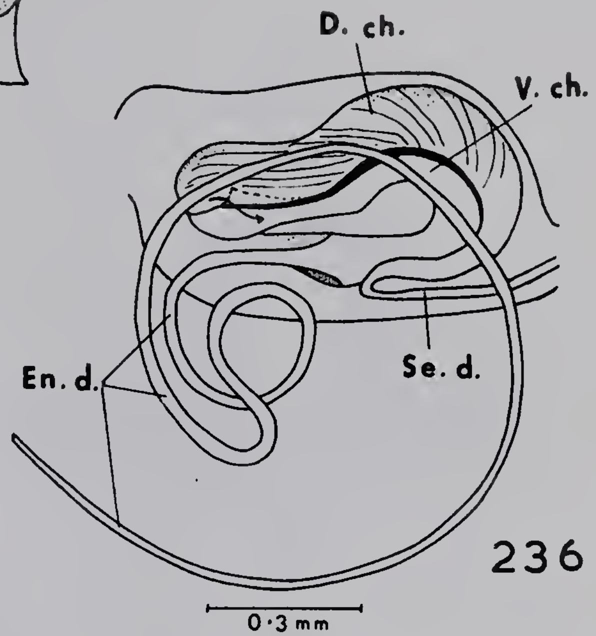

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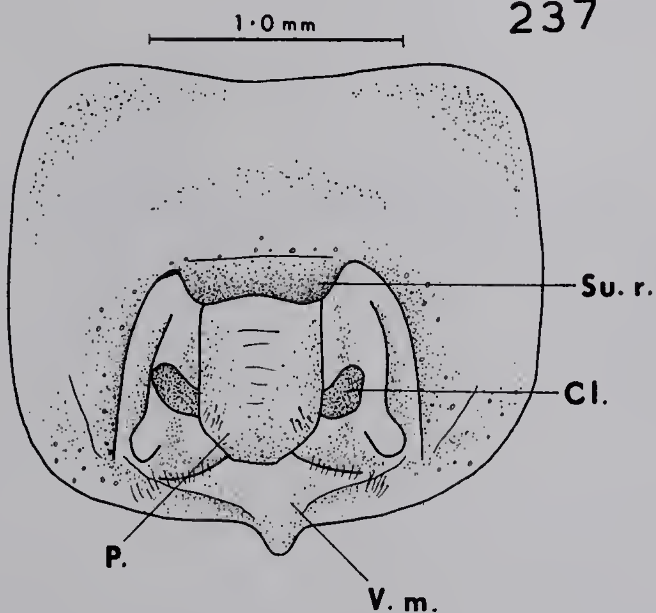

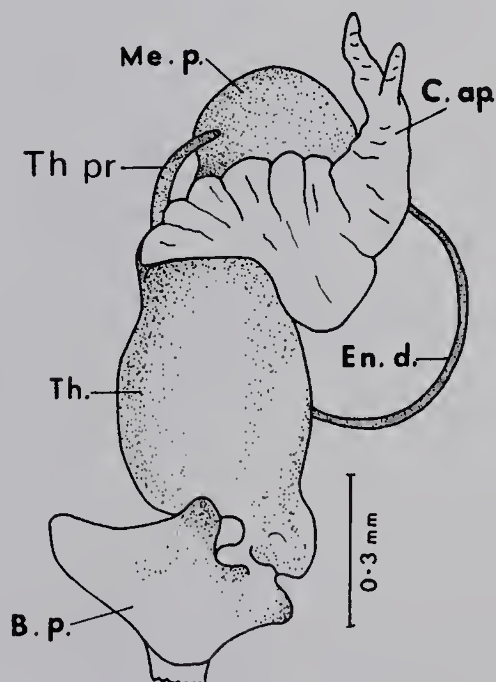

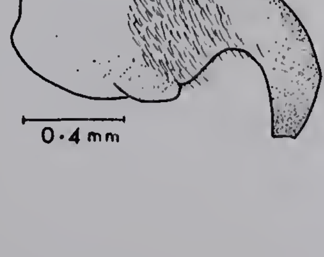

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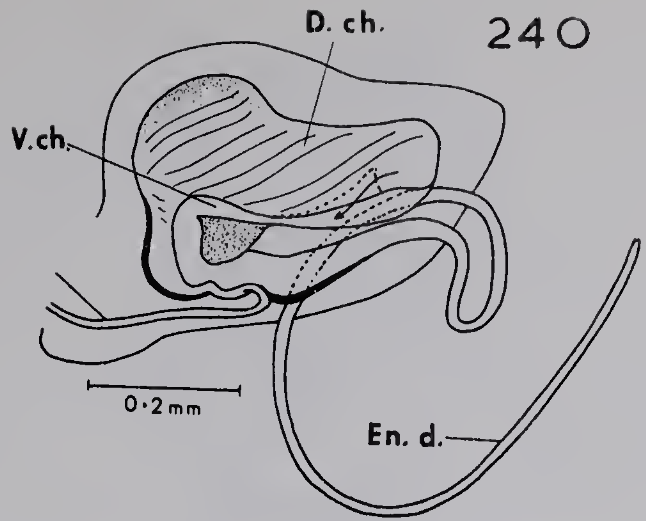
Fig. 240. _Coenus delius_, vesica, lateral view.

Figs. 241 - 245. _Hymenarcys nervosa_.
241, pygophore, dorsal view; 242, clasper; 243, aedoeagus, lateral view; 244, median penal lobes, dorsal view; 245, vesica, lateral view.

Figs. 246 - 247. _Euschistus tristigmus_.
246, pygophore, dorsal view; 247, clasper.



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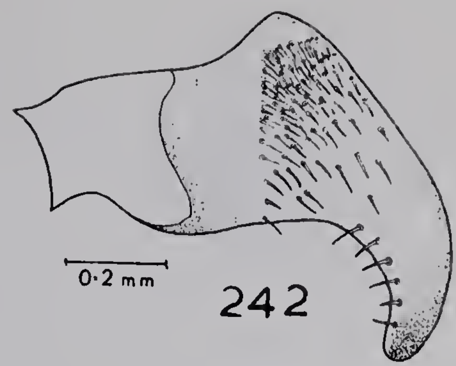

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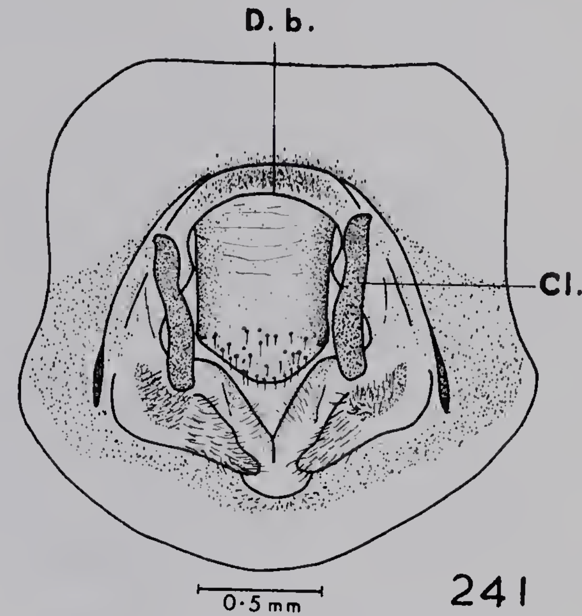

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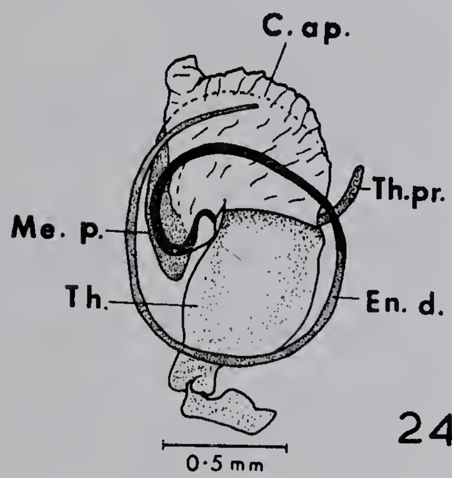

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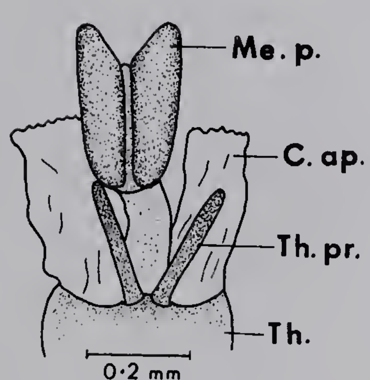

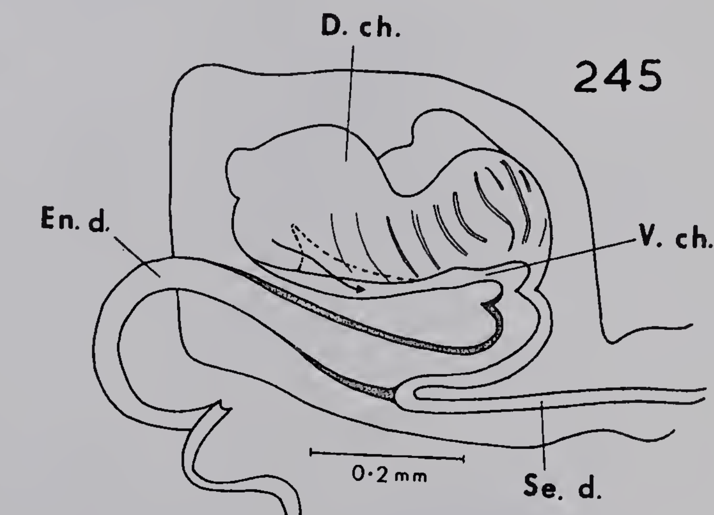

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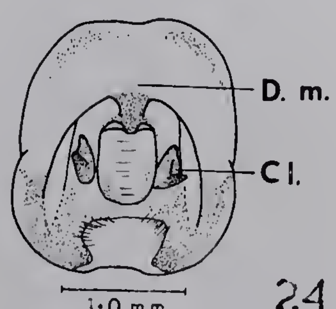

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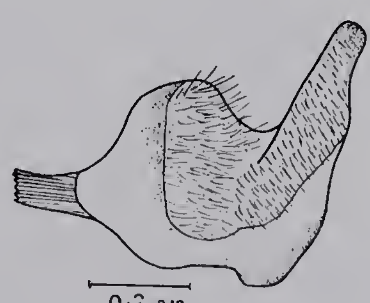

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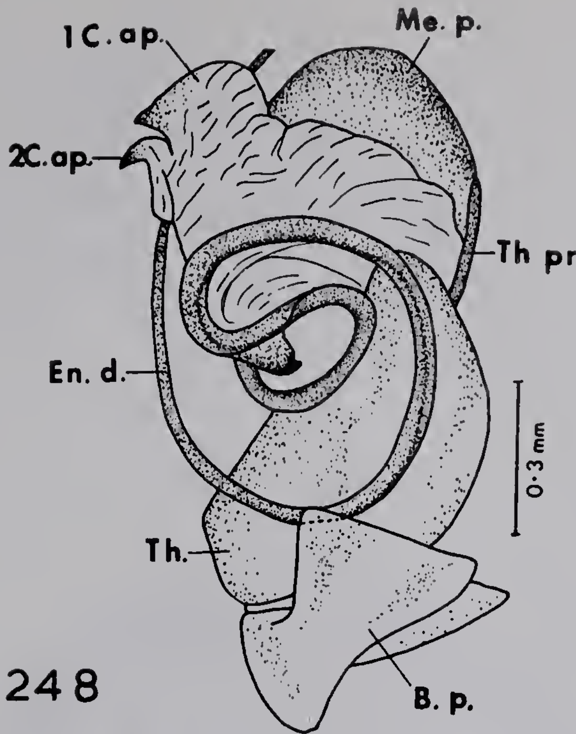
Figs. 248 - 250. _Euschistus_ _tristigmus_.
248, aedoeagus, lateral view;
249, median penal lobes, dorsal
view; 250, vesica, lateral view.

Figs. 251 - 255. _Prionosoma_ _podopioides_.
251, pygophore, dorsal view;
252, clasper; 253, aedoeagus, lateral
view; 254, median penal lobes, dorsal
view; 255, aedoeagus, lateral view.



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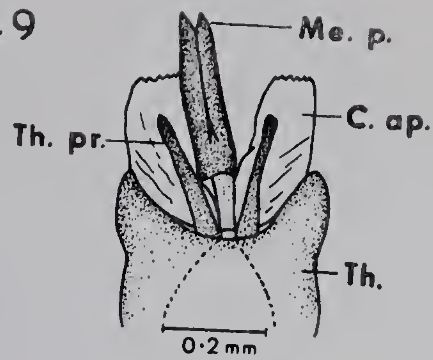

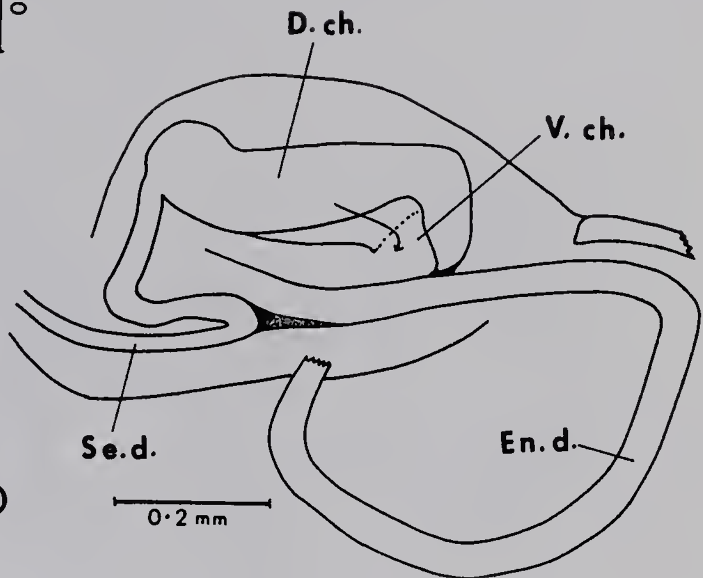

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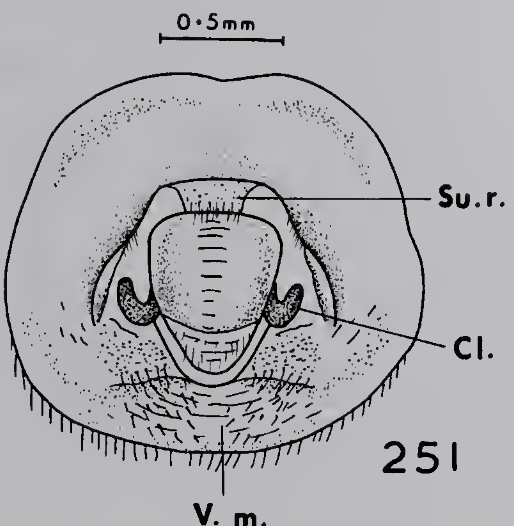

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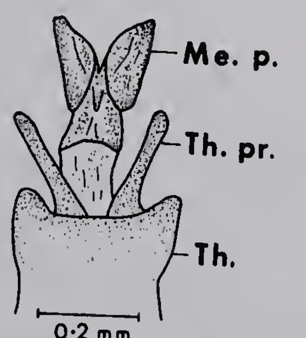

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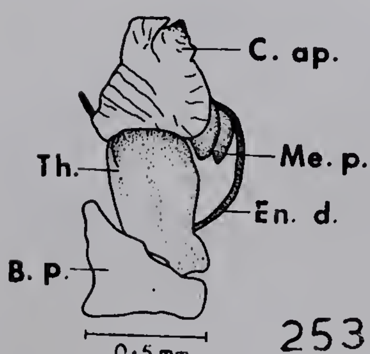

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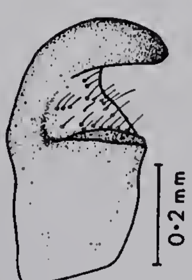

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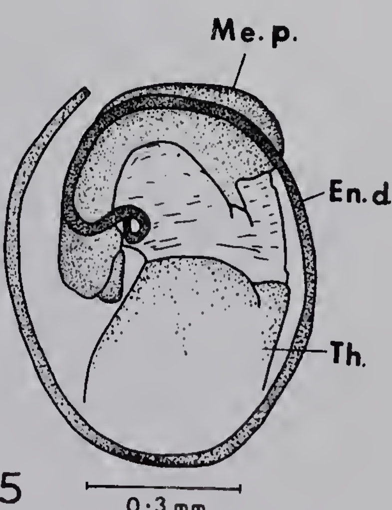

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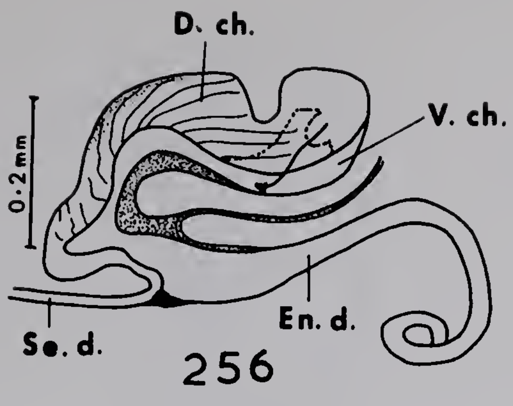
Fig. 256. *Prionosoma podopioides*; vesica, lateral view.

Figs. 257 - 261. *Brochymena arborea*. 257, pygophore, dorsal view; 258, clasper; 259, aedoeagus, lateral view; 260, median penal lobes, dorsal view; 261, vesica, lateral view.

Figs. 262 - 263. *Brochymena quadripustulata*. 262, pygophore, dorsal view; 263, ventral margin.



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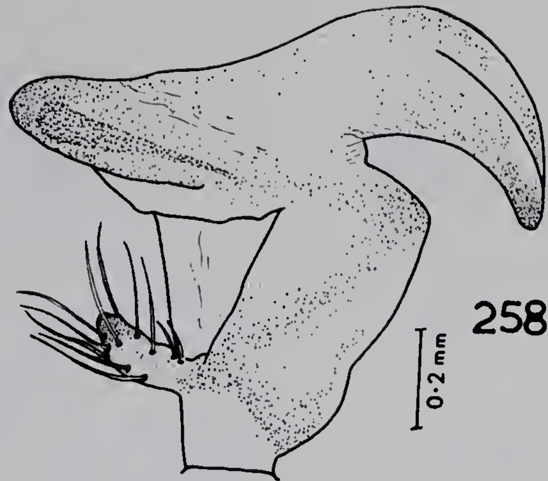

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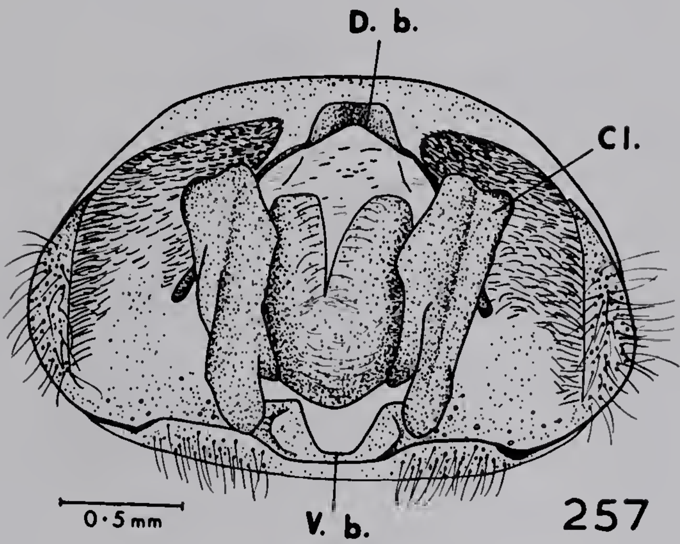

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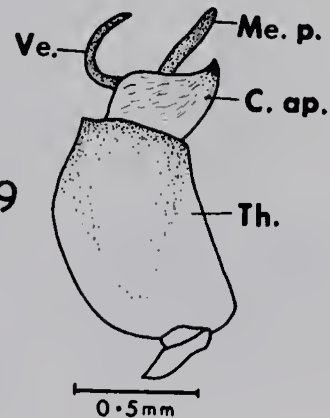

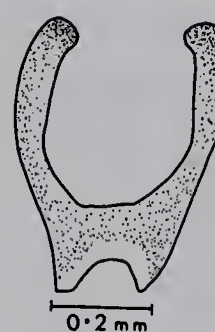

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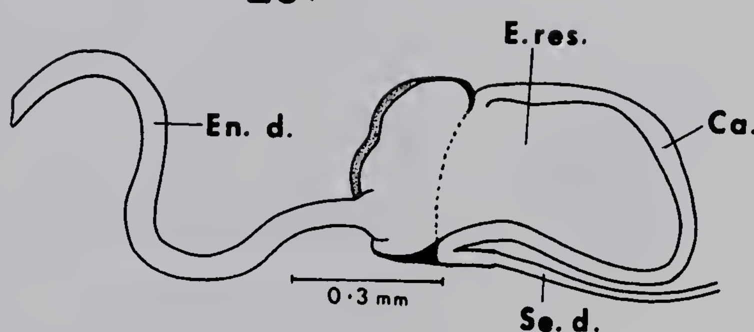

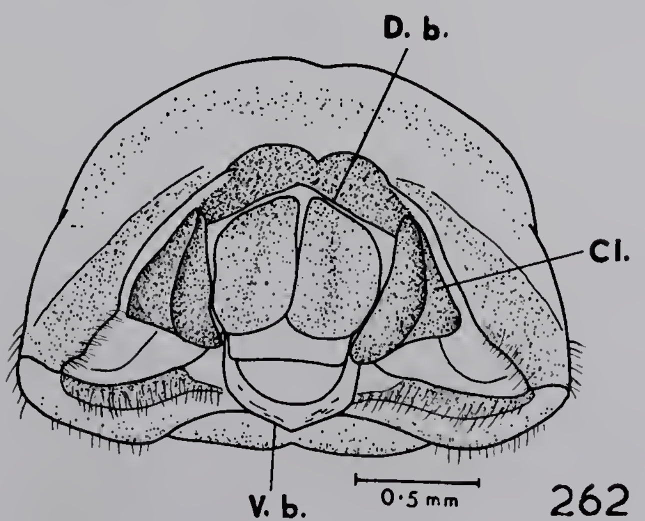

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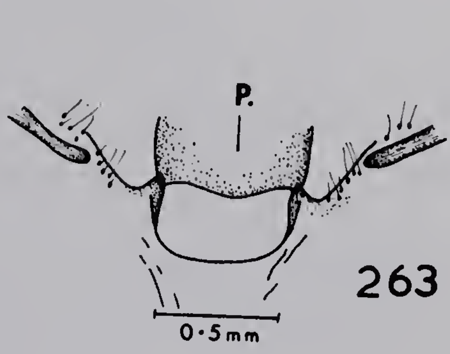

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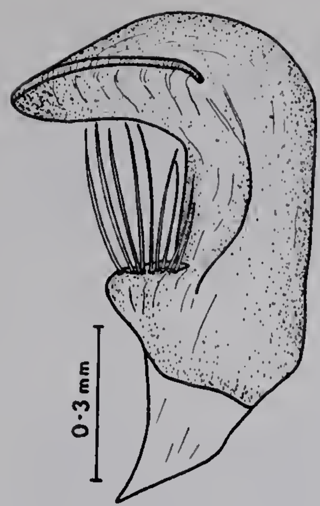
Figs. 264 - 267. _Brochymena_ _quadripustulata_.
264, clasper; 265, aedoeagus, lateral view; 266, median penal lobes, dorsal view; 267, vesica, lateral view.

Figs. 268 - 272. _Edessa_ _bifida_.
268, pygophore, dorsal view;
269, genital plate; 270, clasper;
271, aedoeagus, lateral view;
272, vesica, lateral view.

Fig. 273. _Lineostethus_ _clypeatus_, pygophore, dorsal view.



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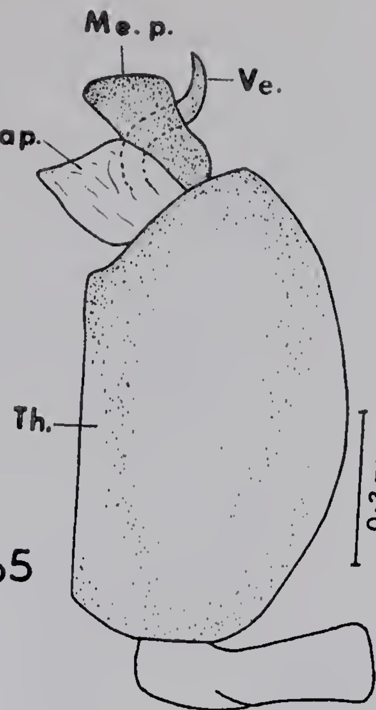

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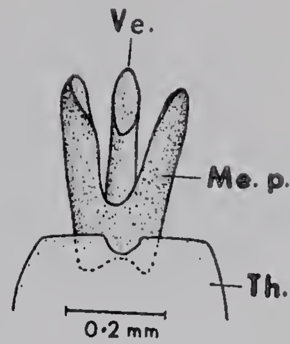

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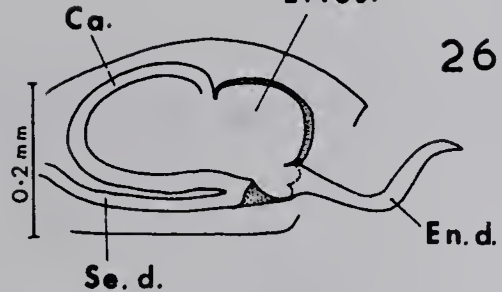

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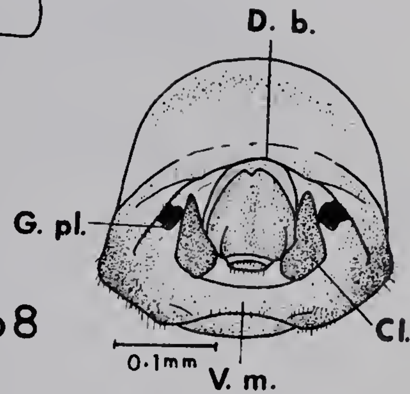

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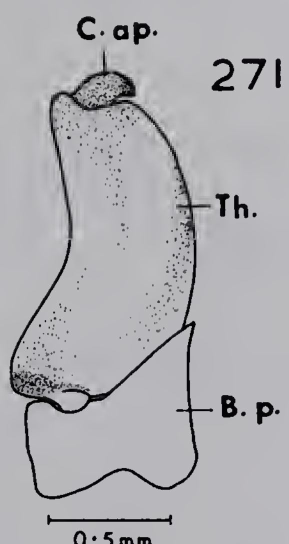

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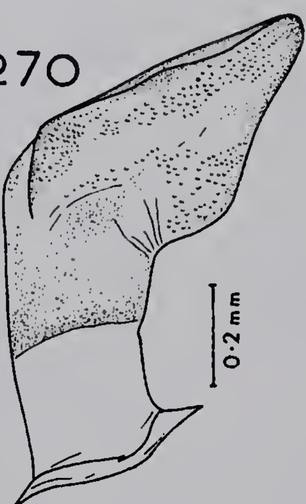

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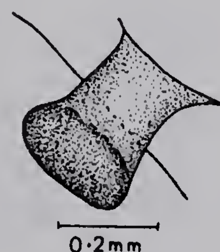

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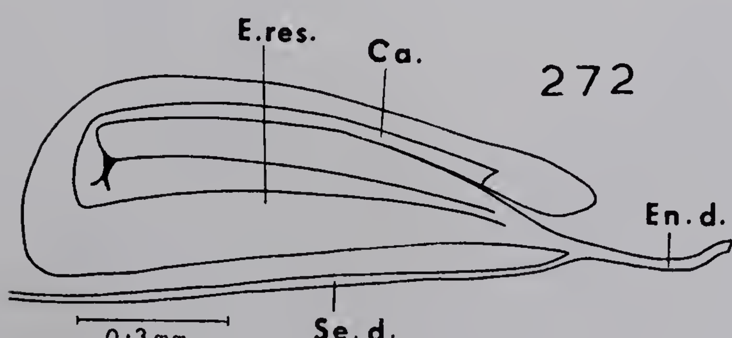

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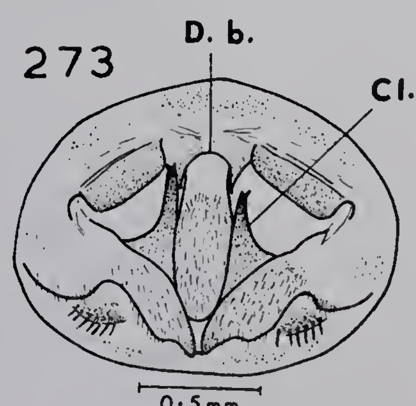

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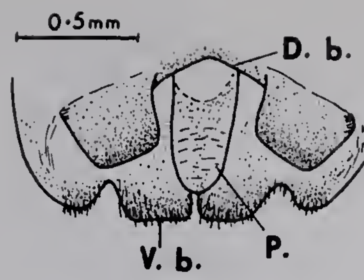
Figs. 274 - 278. _Lineostethus_ _clypeatus_.
274, pygophore, dorsal view;
275, ventral margin; 276, clasper,
inner view; 277, clasper, lateral
view; 278, vesica, lateral view.

Figs. 279 - 281. _Sciocoris_ _micropthalmus_.
279, pygophore, dorsal view;
280, clasper; 281, aedoeagus, dorsal
view.



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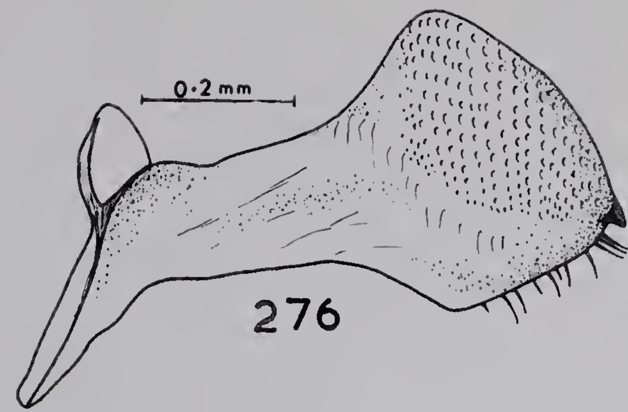

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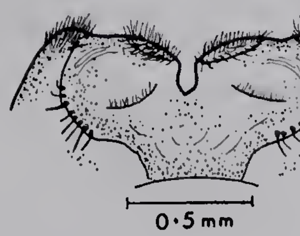

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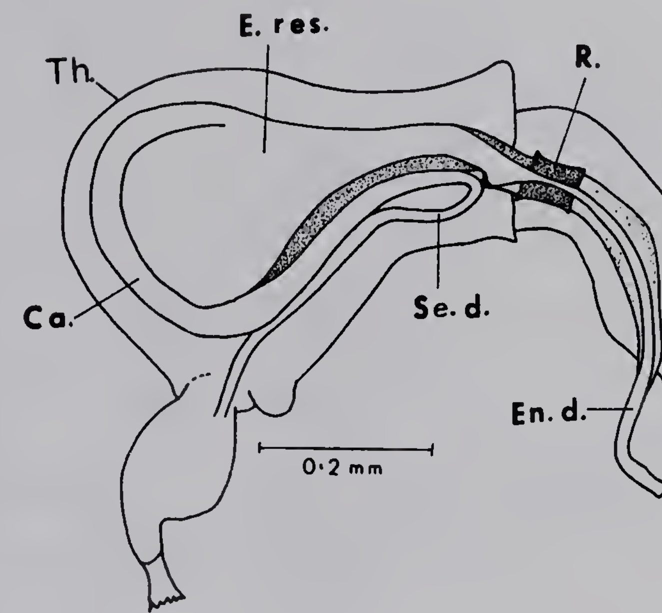

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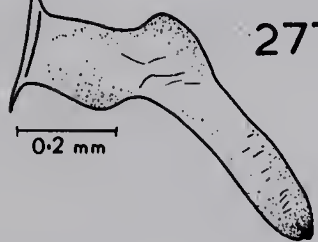

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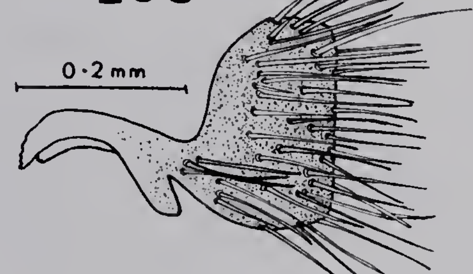

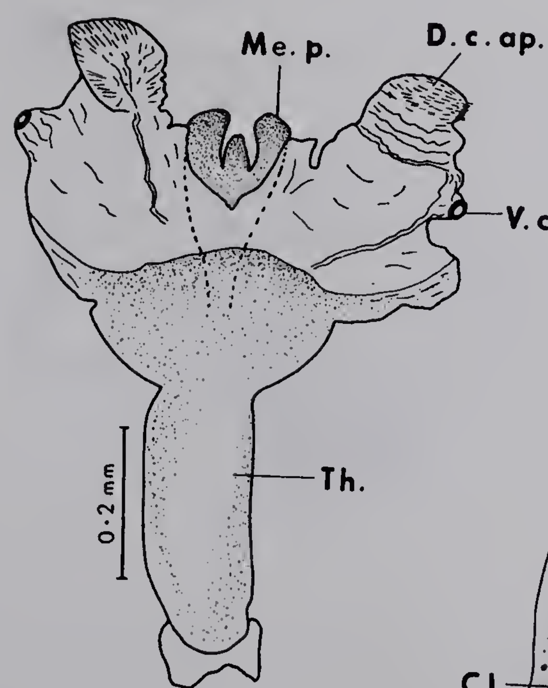

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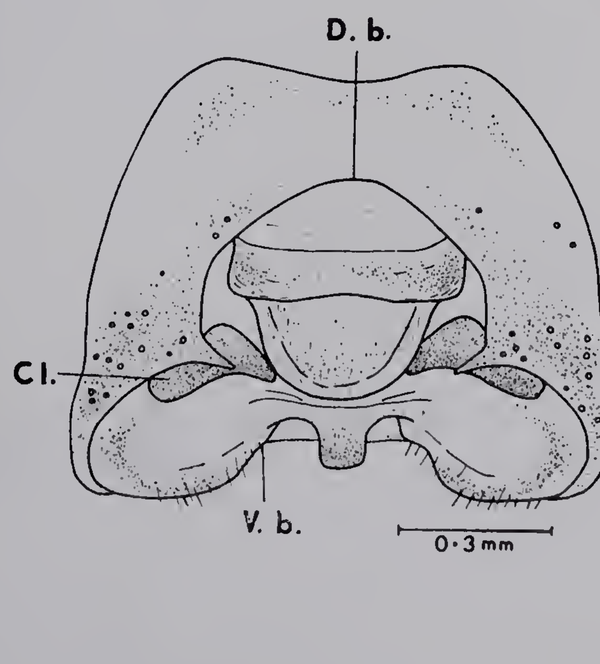

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Figs. 282 - 283. Sciocoris micropthalmus.

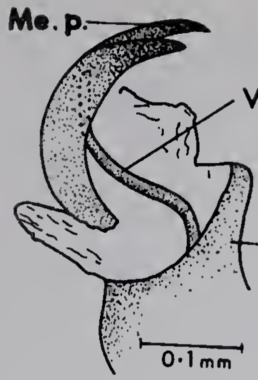
282, median penal lobes, lateral view; 283, vesica, lateral view.

Figs. 284 - 286. Mecidea longula.

284, aedoeagus, lateral view; 285, median penal lobes, dorsal view; 286, vesica, lateral view.

Figs. 287 - 290. Zicrona caerulea.

287, pygophore, dorsal view; 288, ventral border; 289, clasper; 290, aedoeagus, lateral view.



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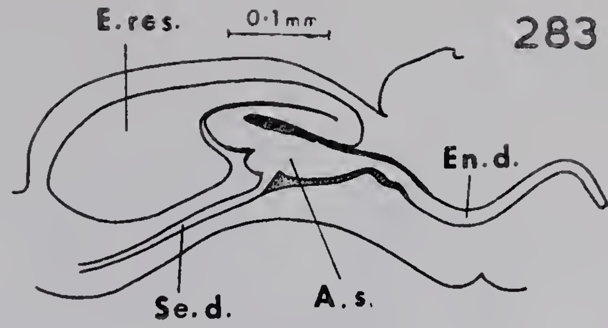

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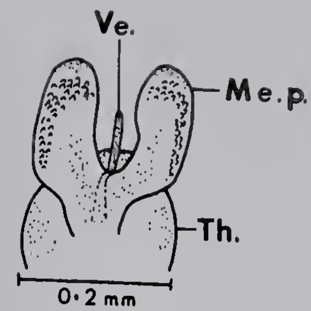

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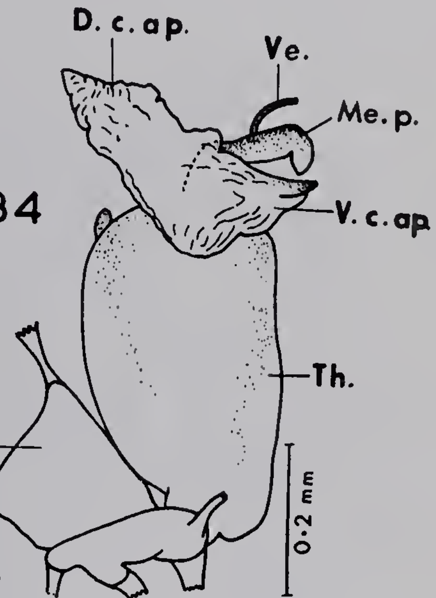

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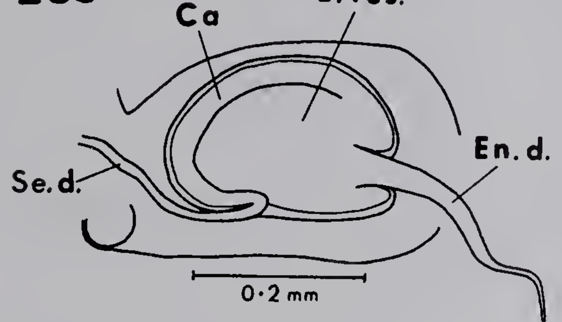

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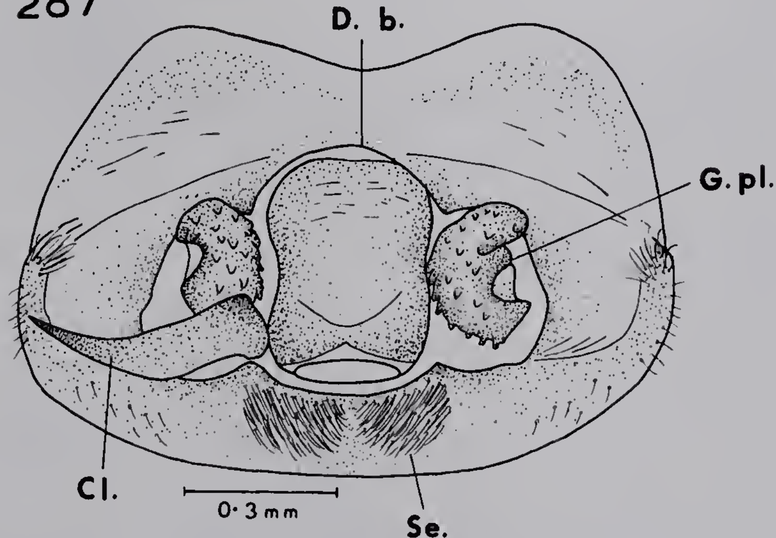

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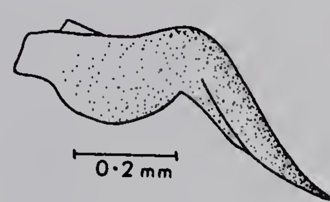

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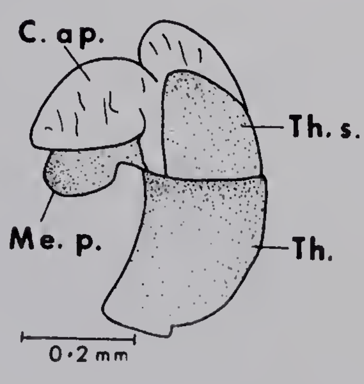

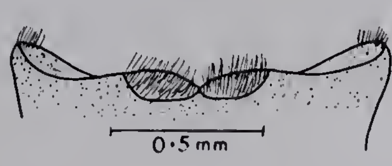

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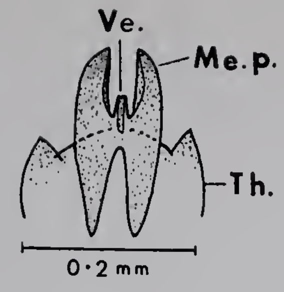
Figs. 291 - 292. *Zicrona caerulea*.
291, median penal lobes, dorsal view; 292, vesica, lateral view.

Figs. 293 - 297. *Oplomus tripustulatus*.
293, pygophore, dorsal view; 294, clasper; 295, aedoeagus, lateral view; 296, median penal lobes, dorsal view; 297, vesica, lateral view.

Figs. 298 - 299. *Heterosceloides lepida*.
298, pygophore, dorsal view; 299, clasper.



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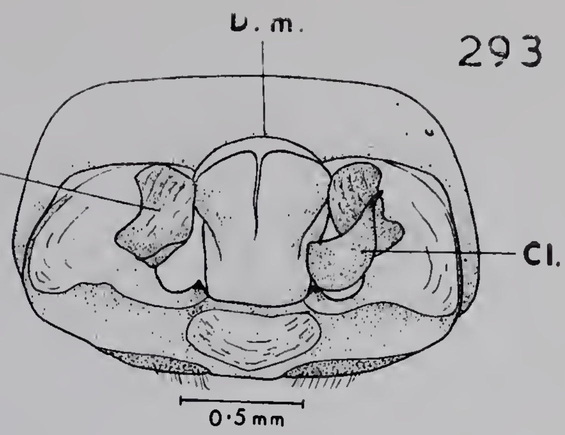

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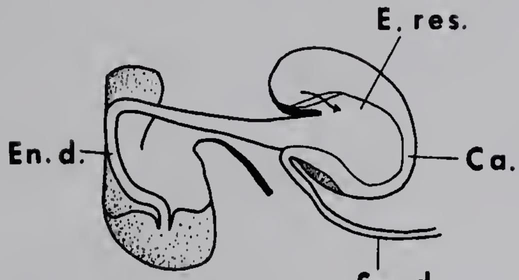

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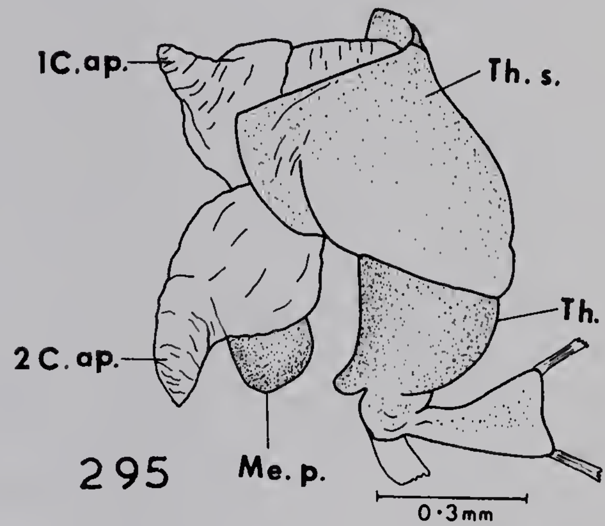

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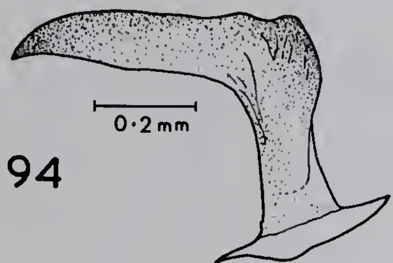

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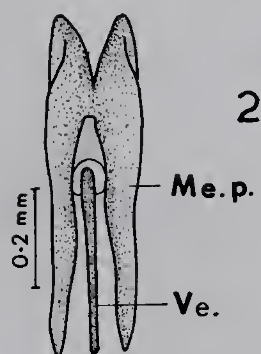

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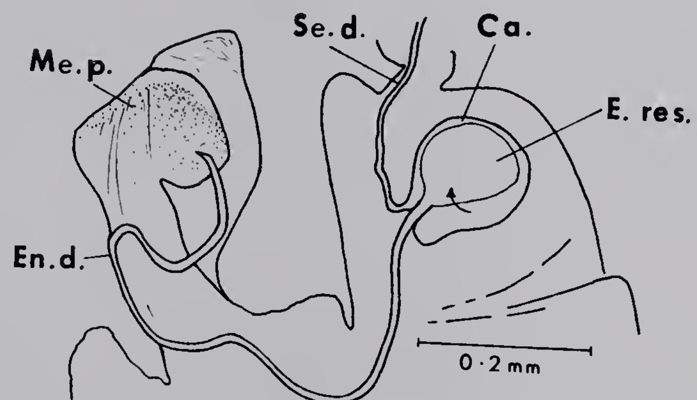

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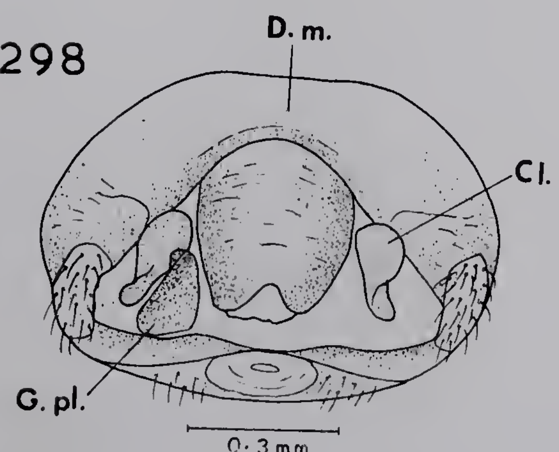

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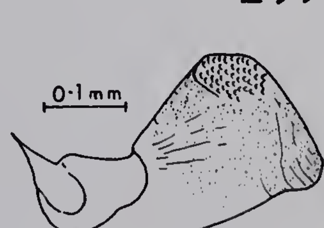

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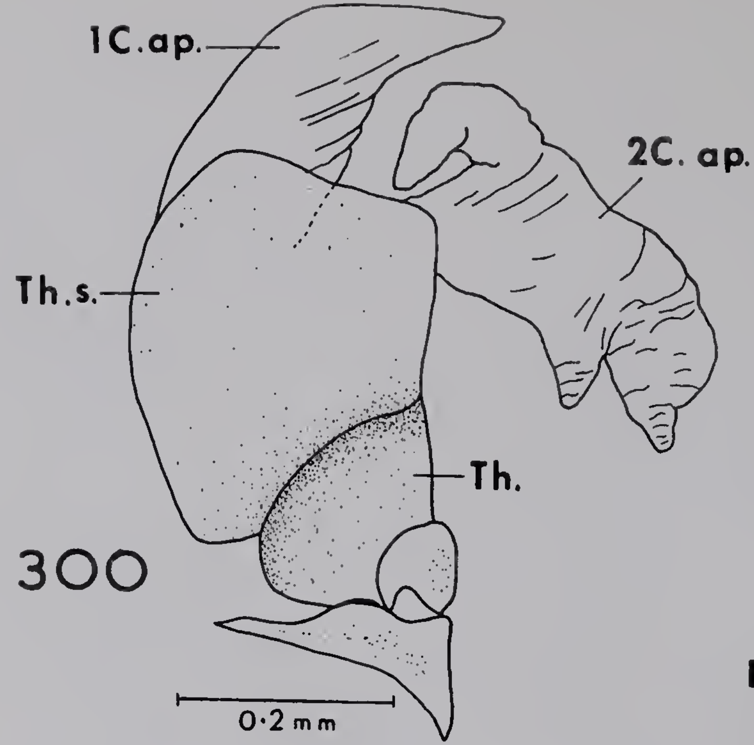
Figs. 300 - 302. *Heterosceloides lepida*.
300, aedoeagus, lateral view;
301, median penal lobes, ventral view; 302, vesica, lateral view.

Figs. 303 - 306. *Rhacognathus americanus*.
303, pygophore, dorsal view;
304, clasper; 305, aedoeagus, lateral view.



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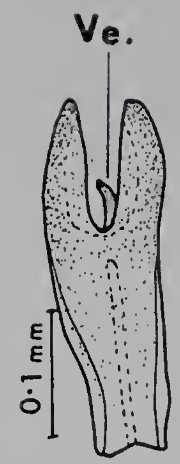

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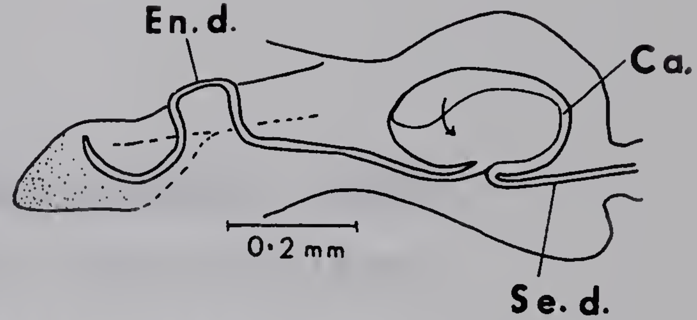

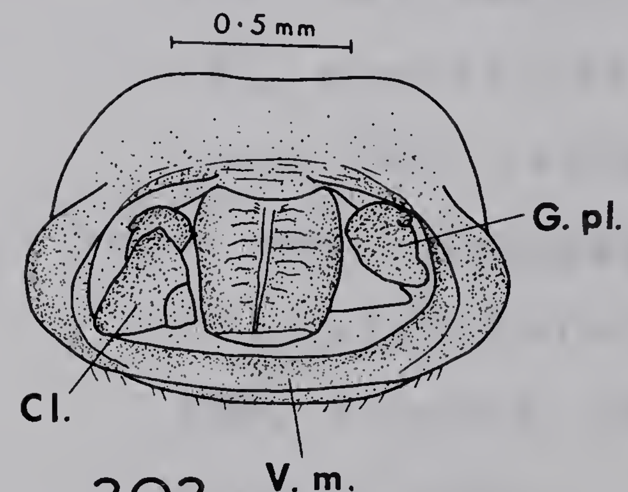

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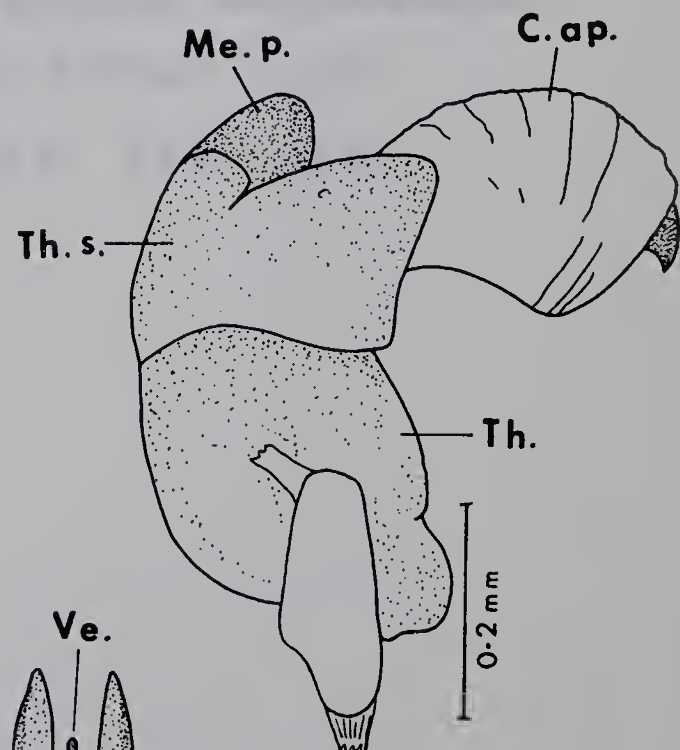

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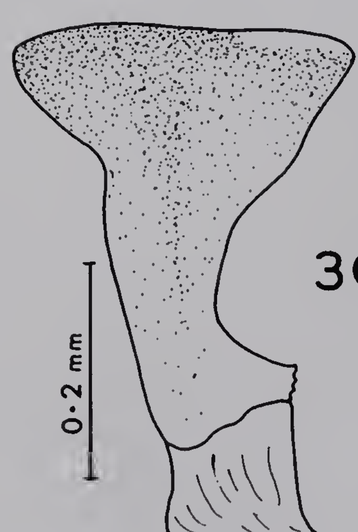

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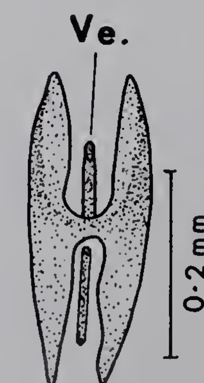

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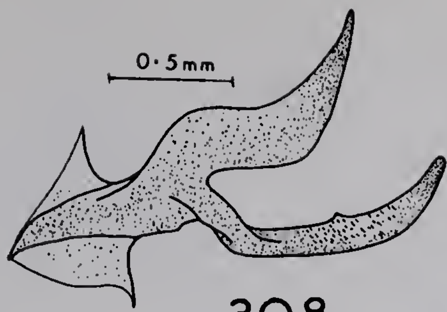
Fig. 307. Rhacognathus americanus, vesica, lateral view.

Fig. 308 - 311. Apateticus bracteatus. 308, clasper; 309, aedoeagus, lateral view; 310, median penal lobes, dorsal view; 311, vesica, lateral view.

Figs. 312 - 313. Apateticus lineolatus. 312, pygophore, dorsal view; 313, clasper.



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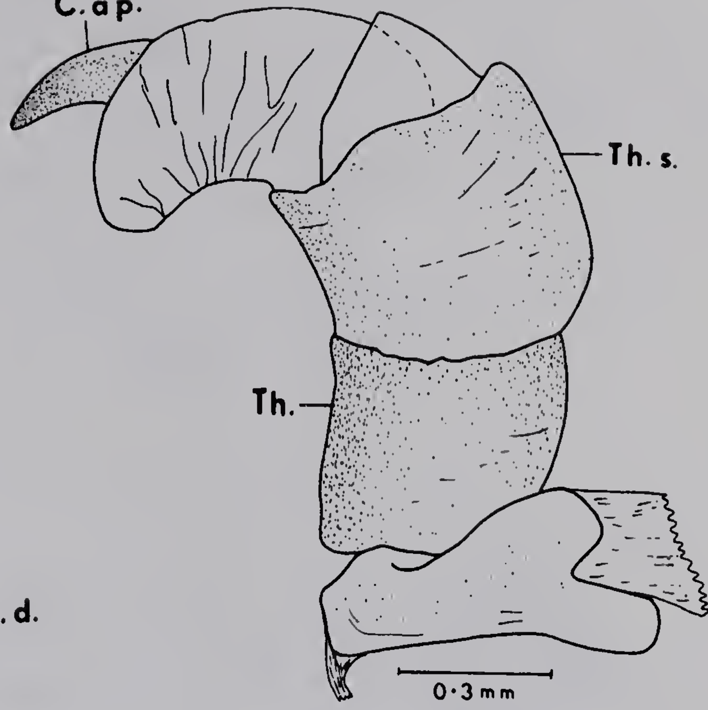

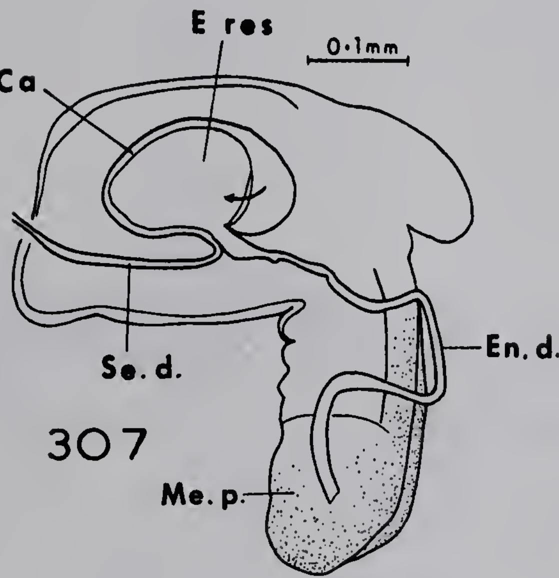

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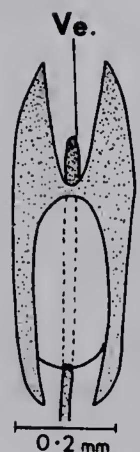

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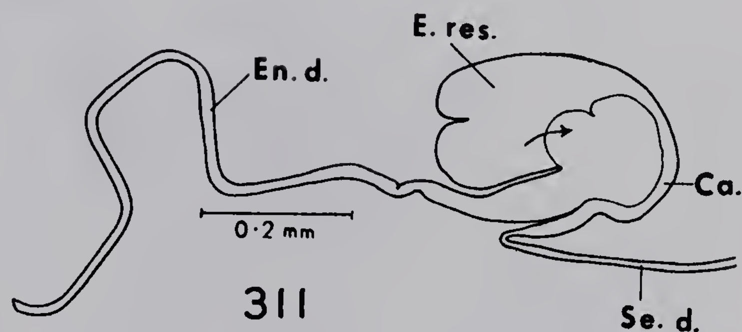

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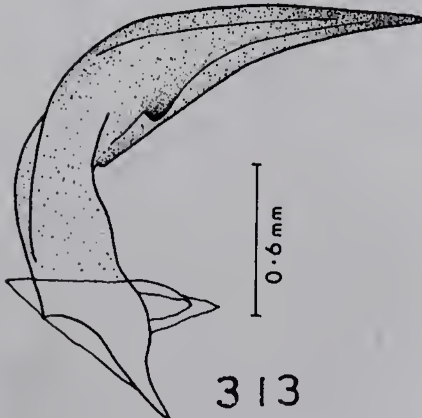

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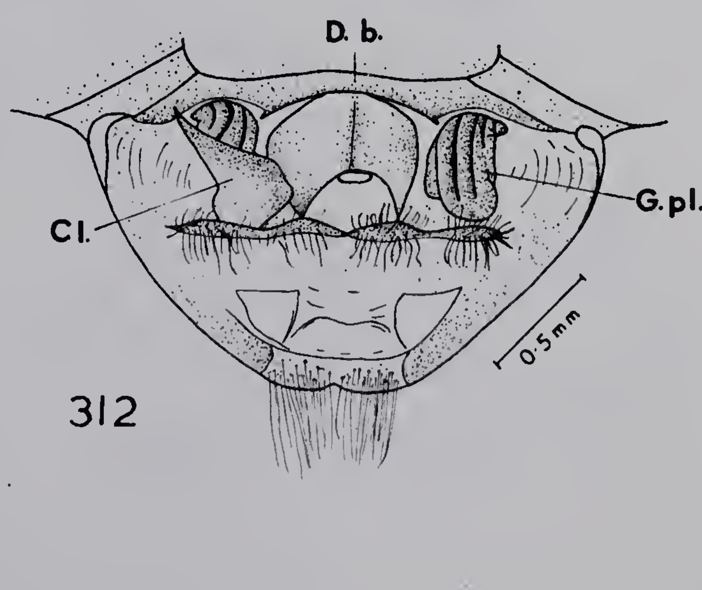

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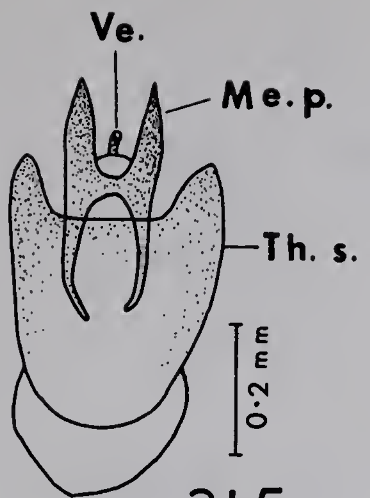
Figs. 314 - 316. _Apateticus lineolatus_.
314, aedoeagus, lateral view;
315, median penal lobes, ventral view; 316, vesica, lateral view.

Figs. 317 - 322. _Podisius acutissimus_.
317, pygophore, dorsal view;
318, ventral margin; 319, dorsal margin; 320, clasper; 321, aedoeagus, lateral view; 322, vesica, lateral view.



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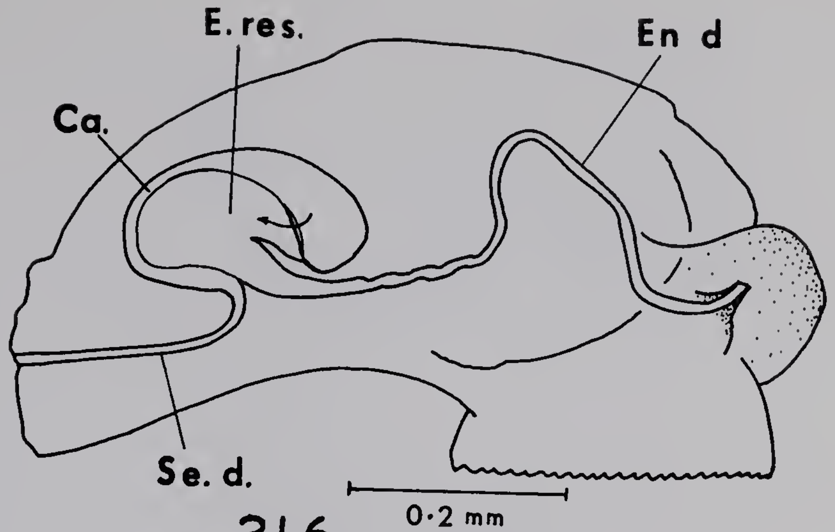

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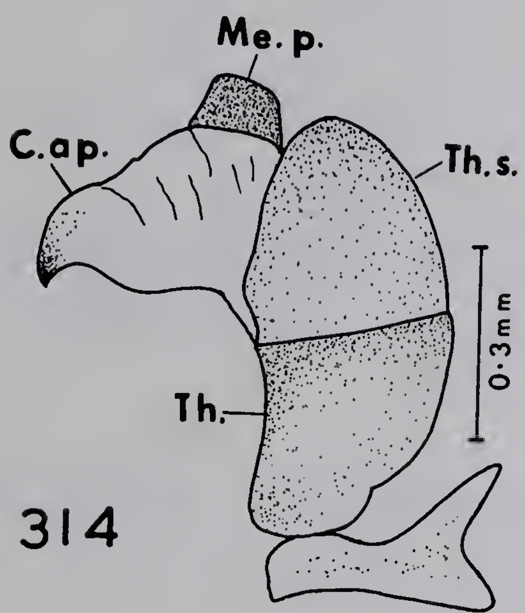

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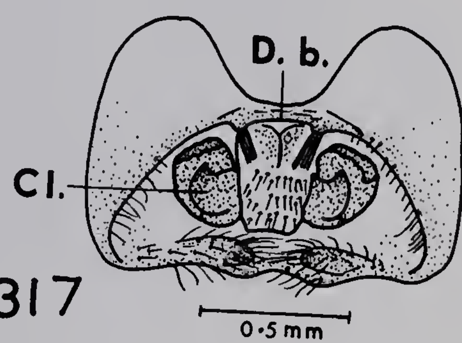

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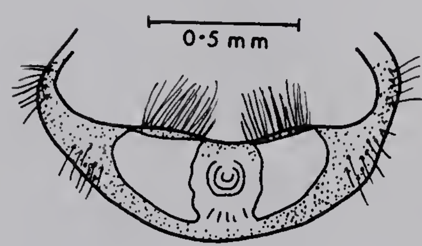

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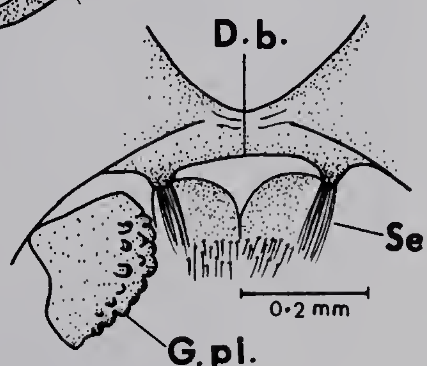

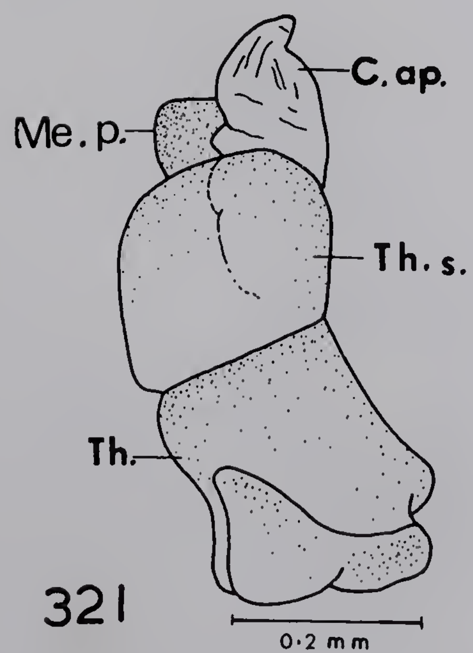

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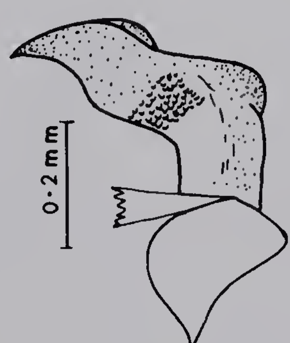

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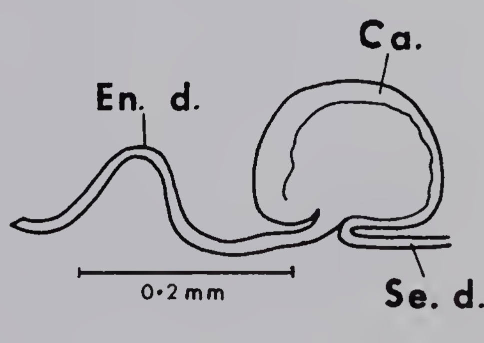

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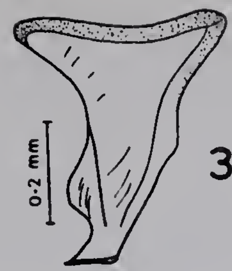
Figs. 323 - 325. *Podisus* *maculiventris*.

323, clasper; 324, aedoeagus, lateral view;

Figs. 326 - 329. *Alcaeorrhyncus* *grandis*.

326, pygophore, dorsal view;

327, clasper; 328, aedoeagus, lateral view; 329, median penal lobes, ventral view.



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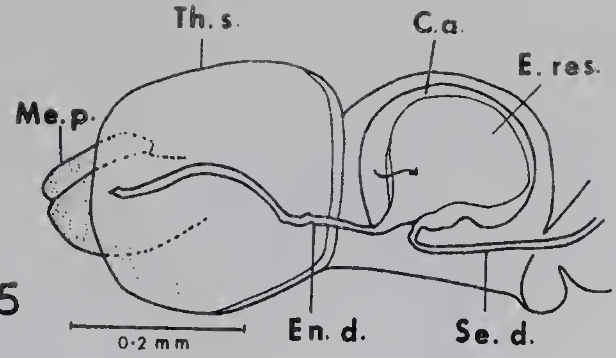

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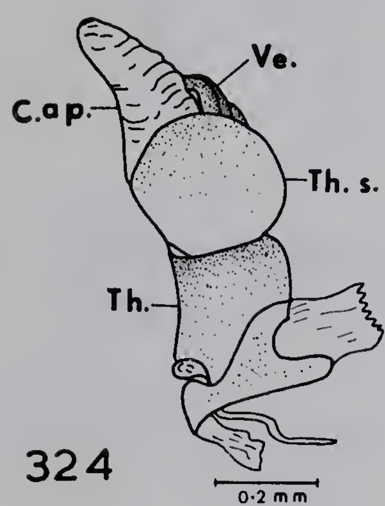

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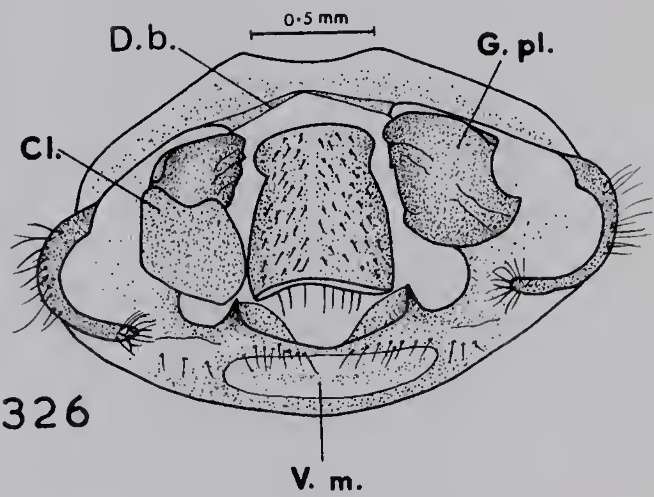

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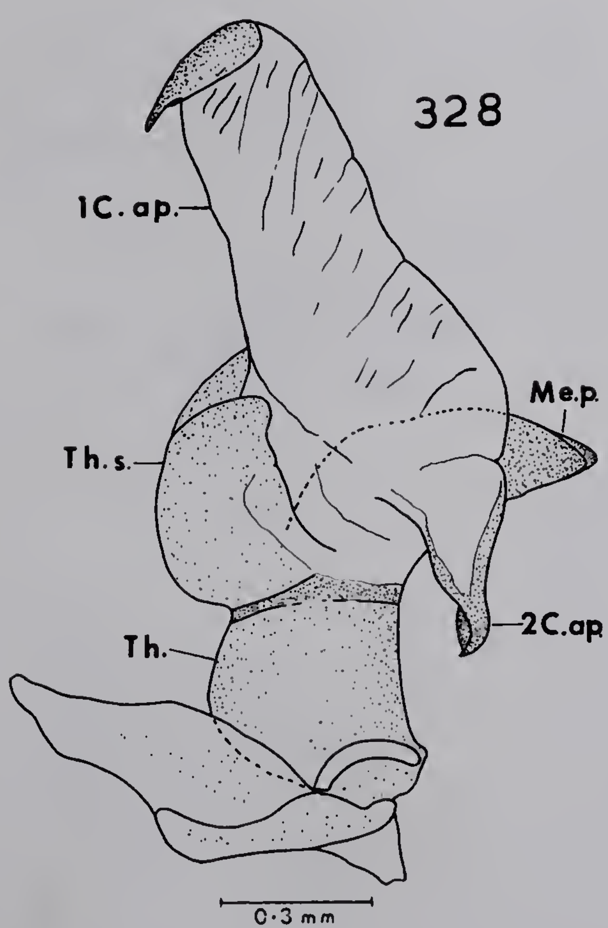

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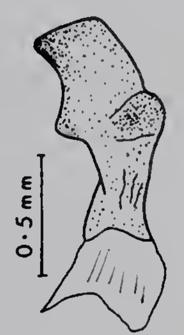

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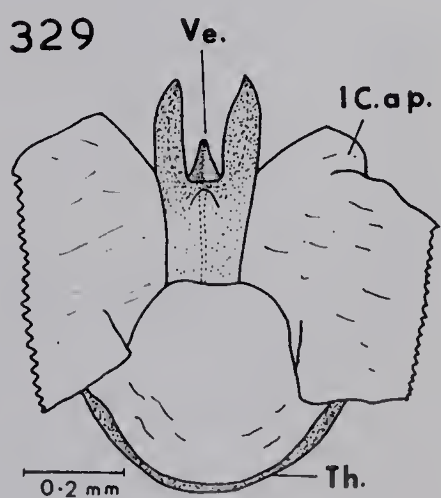

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Fig. 330. _Alcaeorrhynchus grandis_, vesica, lateral view.

Figs. 331 - 334. _Euthyrhynchus floridanus_. 331, pygophore, dorsal view; 332, clasper; 333, aedoeagus, lateral view; 334, vesica, lateral view.

Figs. 335 - 336. _Stiretrus anchorago_. 335, pygophore, dorsal view; 336, clasper.

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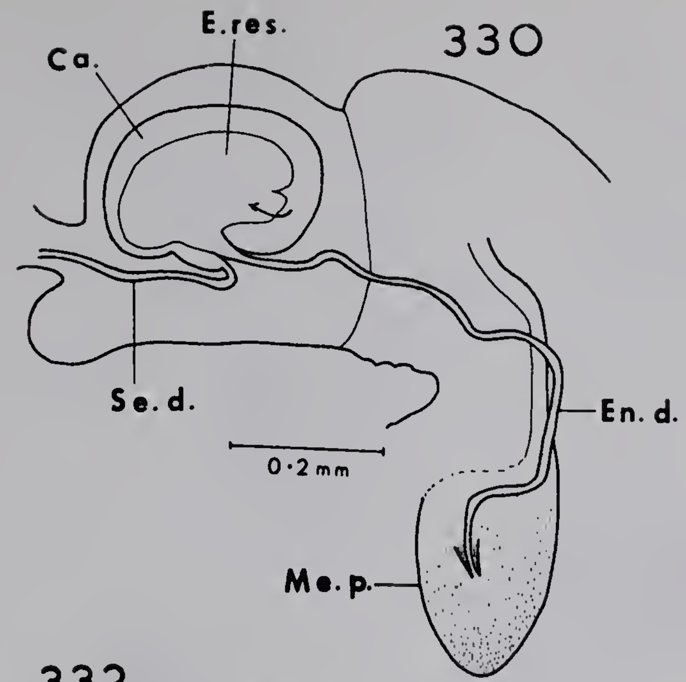

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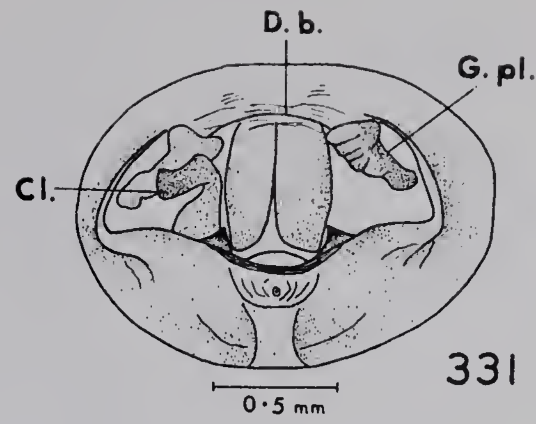

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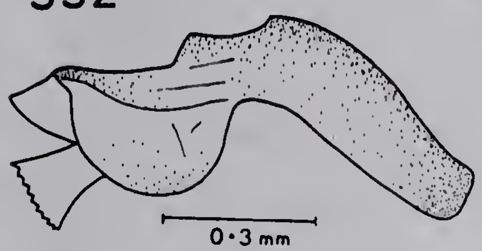

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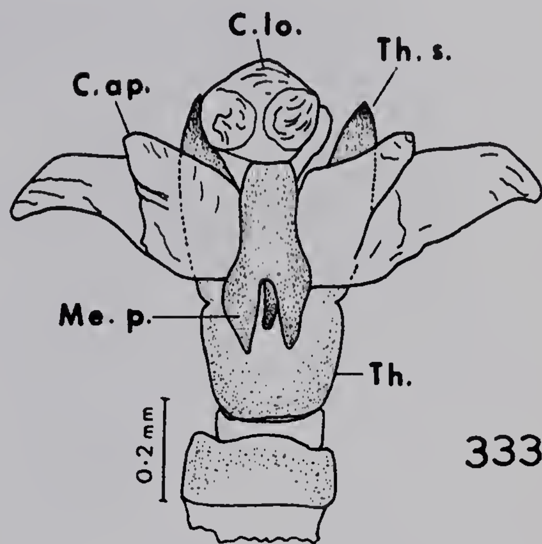

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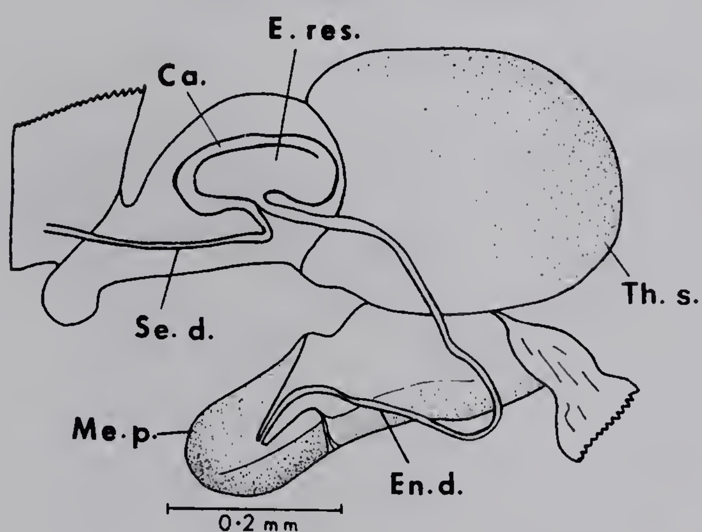

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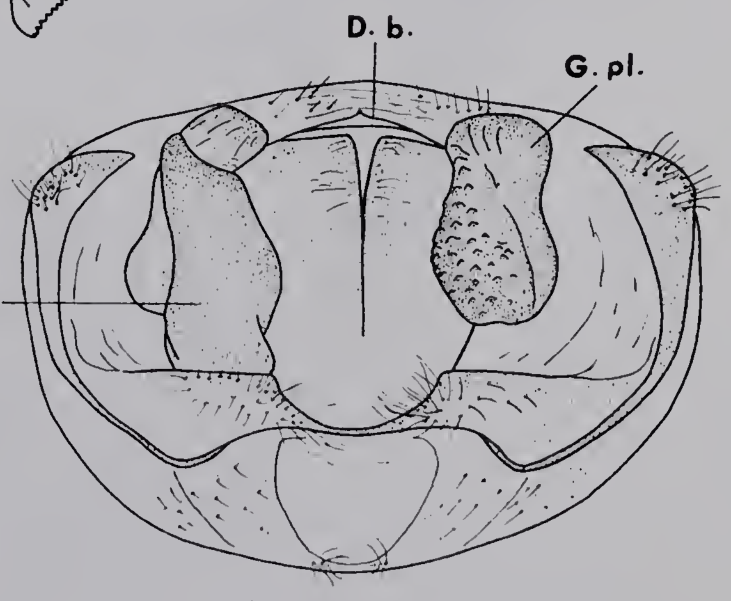

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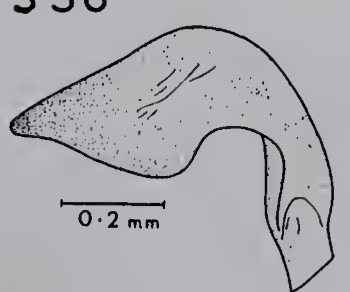
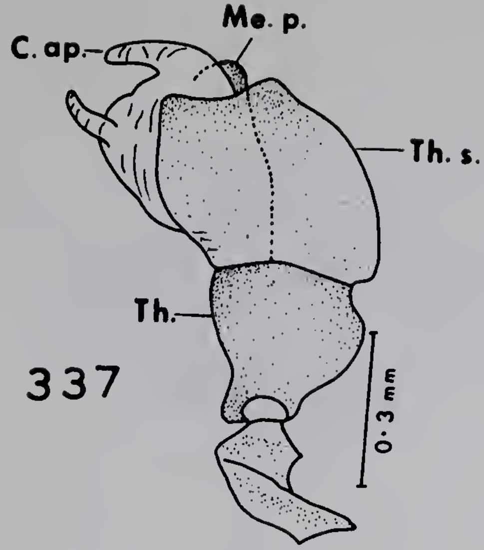


Figs. 337 - 339. Stiretrus anchorago.
337, aedoeagus, lateral view;
338, median penal lobes, dorsal view; 339, vesica, lateral view.

Figs. 340 - 343. Mineus strigipes.
340, pygophore, dorsal view;
341, clasper; 342, aedoeagus, lateral view; 343, vesica, lateral view.



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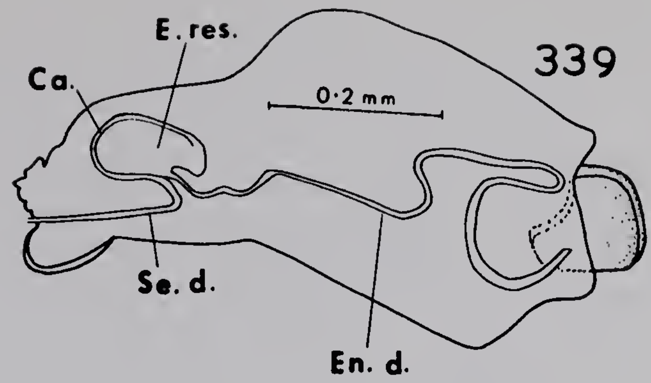

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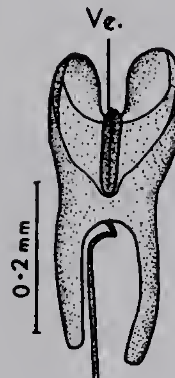

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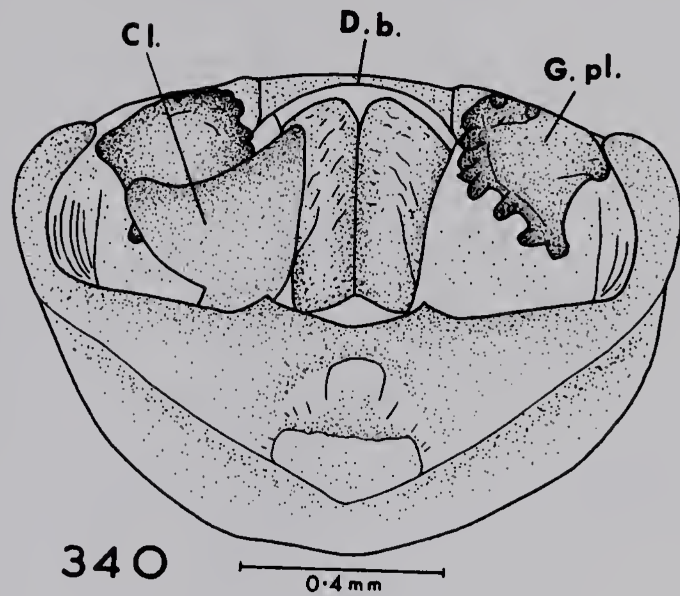

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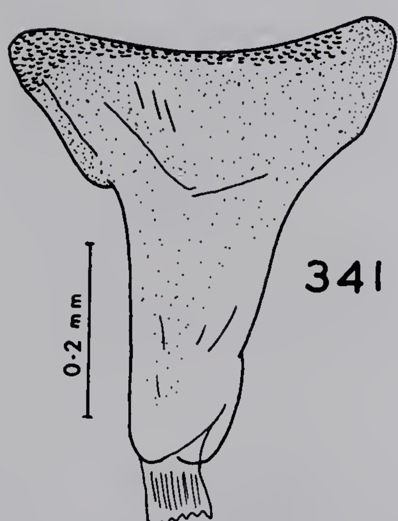

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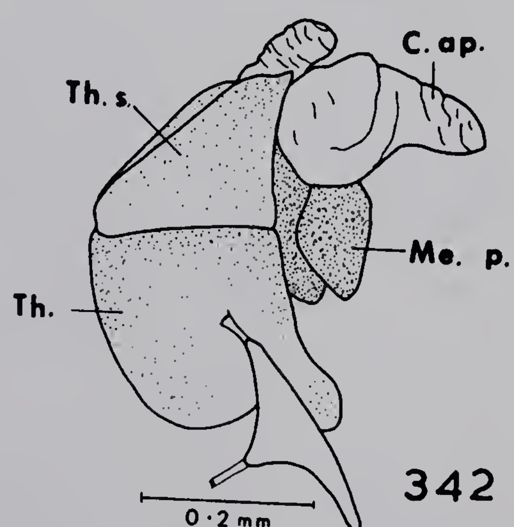

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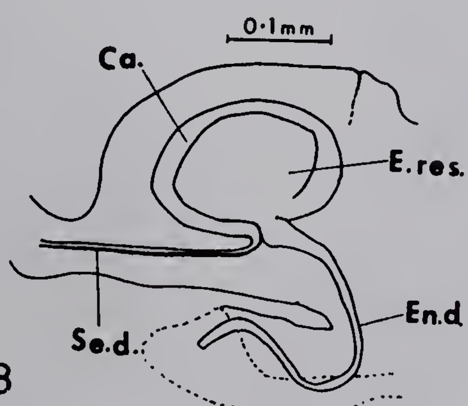

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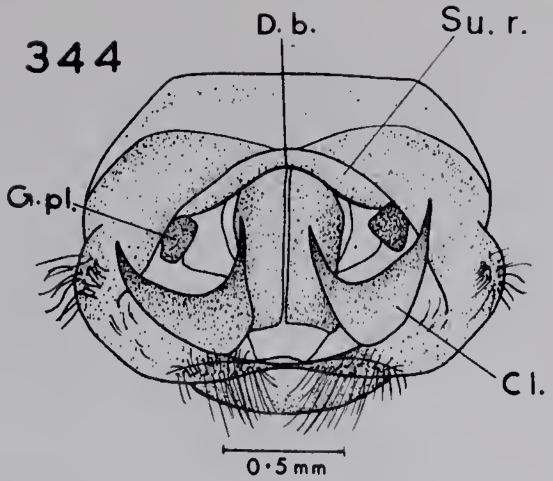
Figs. 344 - 348. Andrallus spinidens.

344, pygophore, dorsal view; 345, clasper; 346, aedoeagus, lateral view; 347, aedoeagus, anterior view; 348, vesica, lateral view.

Figs. 349 - 352. Amaurochrous cinctipes.

349, pygophore, dorsal view; 350, pygophoral appendage; 351, clasper, inner view; 352, clasper, lateral view.

344



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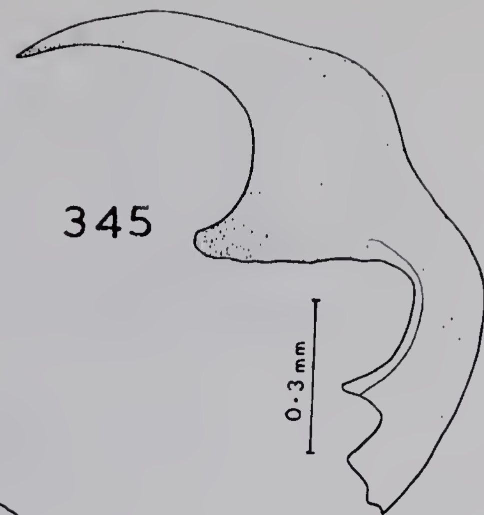

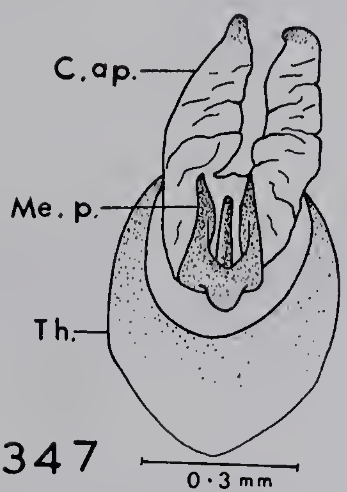

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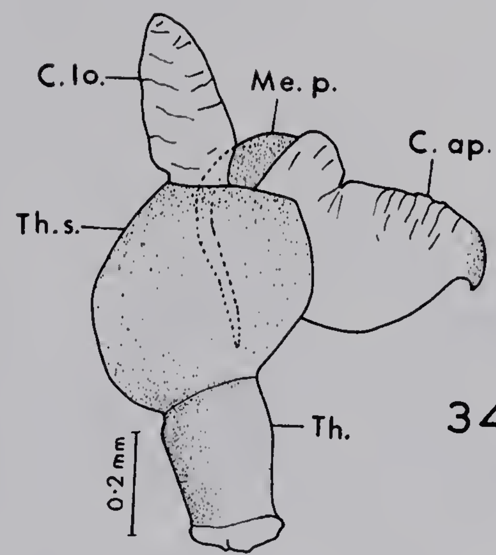

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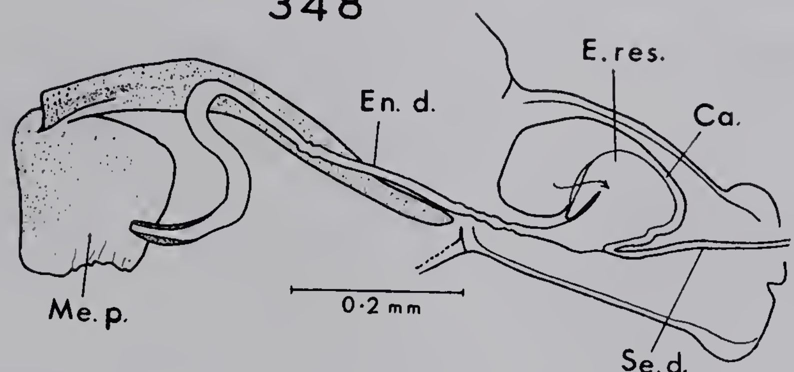

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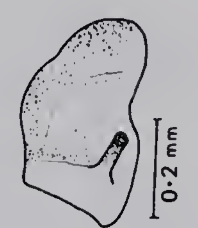

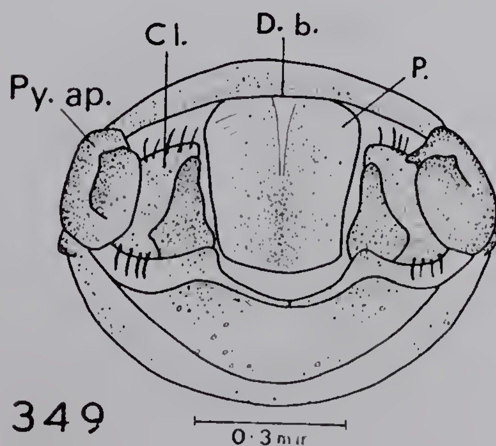

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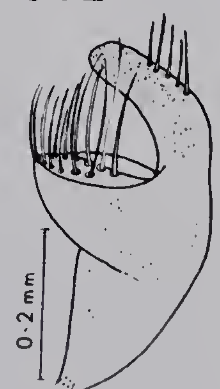


Figs. 353 - 355. *Amaurochrous* *cinctipes*.

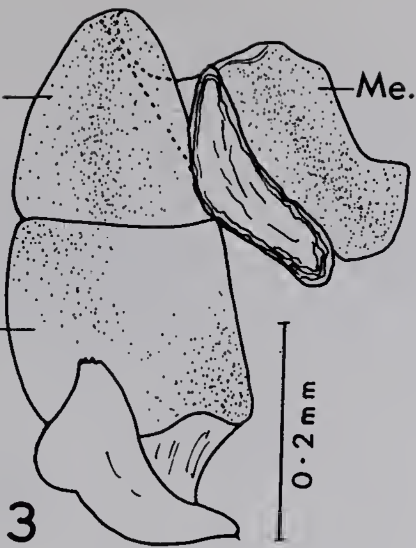
353, aedoeagus, lateral view;

354, median penal lobes, posterior view; 355, vesica, lateral view.

Figs. 356 - 360. *Weda* *parvula*.

356, pygophore, dorsal view;

357, clasper; 358, aedoeagus, lateral view; 359, median penal lobes, dorsal view; 360, vesica, lateral view.



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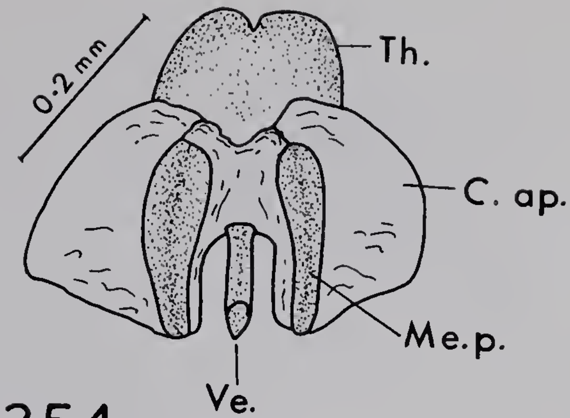

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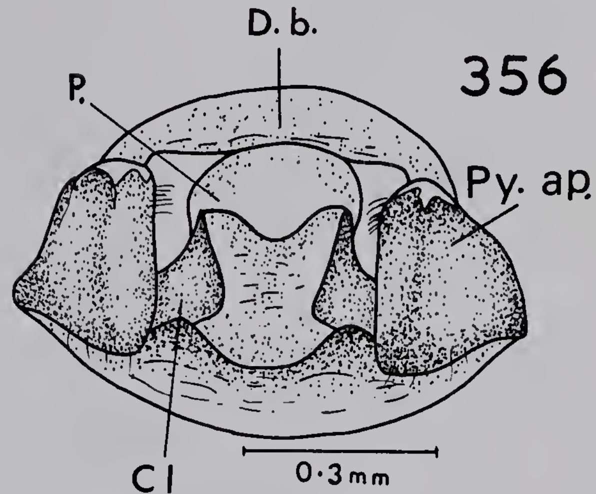

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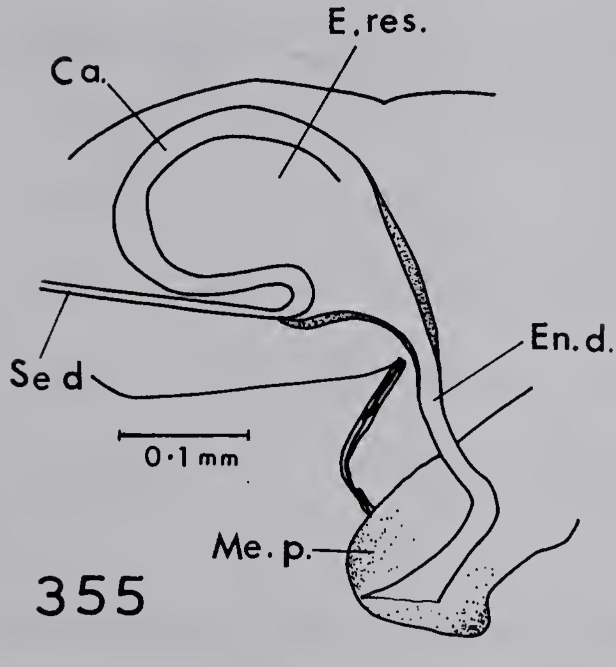

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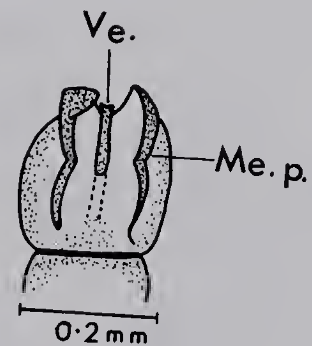

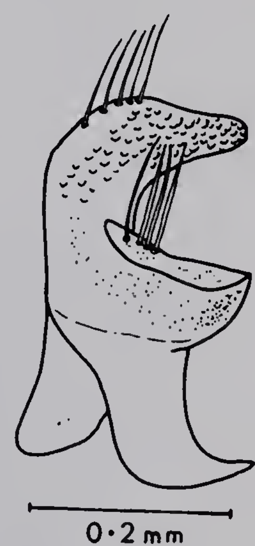

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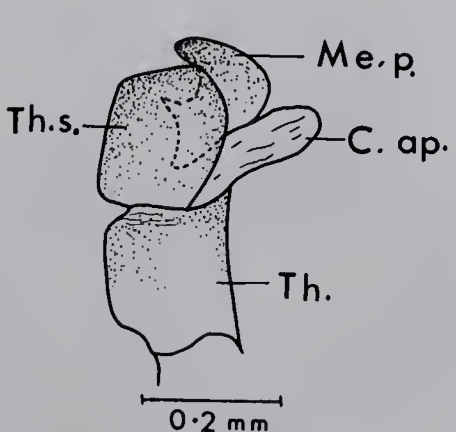

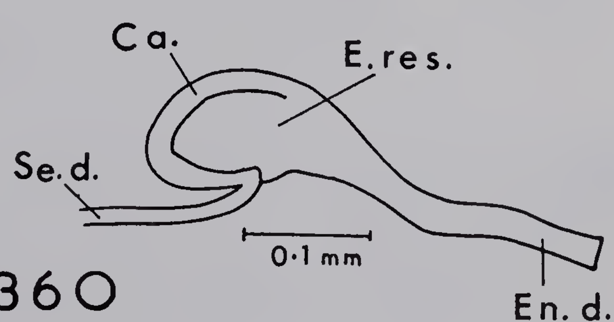

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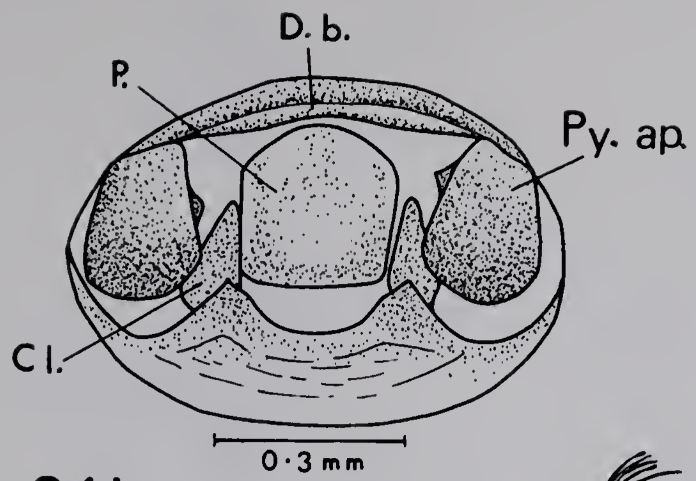
Figs. 361 - 366. _Oncozygia clavicornis_.
361, pygophore, dorsal view;
362, clasper; 363, aedoeagus,
lateral view; 364, aedoeagus, dorsal
view; 365, median penal lobes,
lateral view; 366, vesica, lateral
view.

Figs. 367 - 369. _Piezosternum subulatum_.
367, pygophore, dorsal view;
368, ventral border; 369, clasper.



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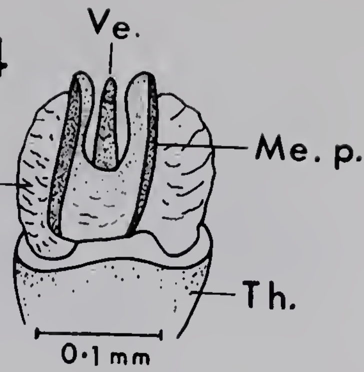

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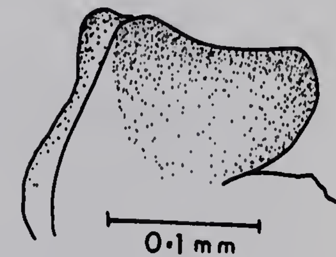

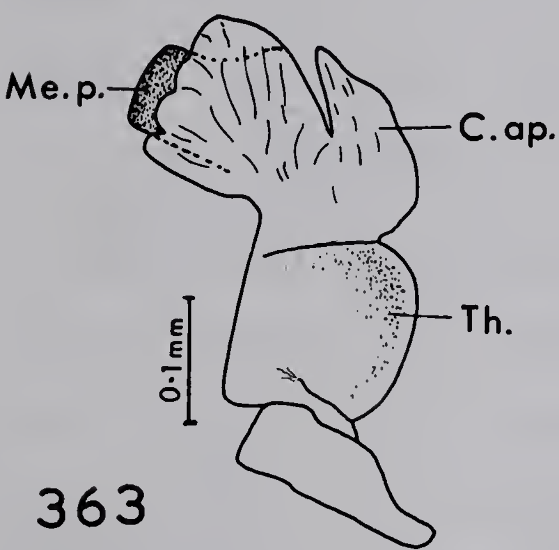

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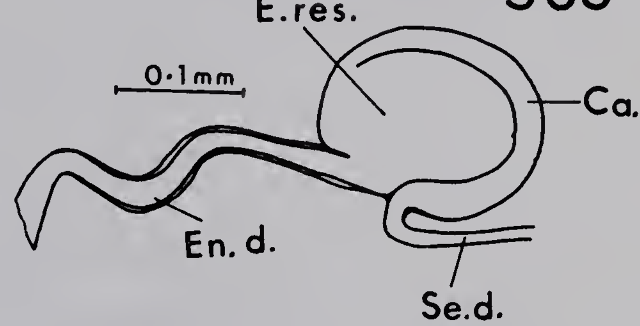

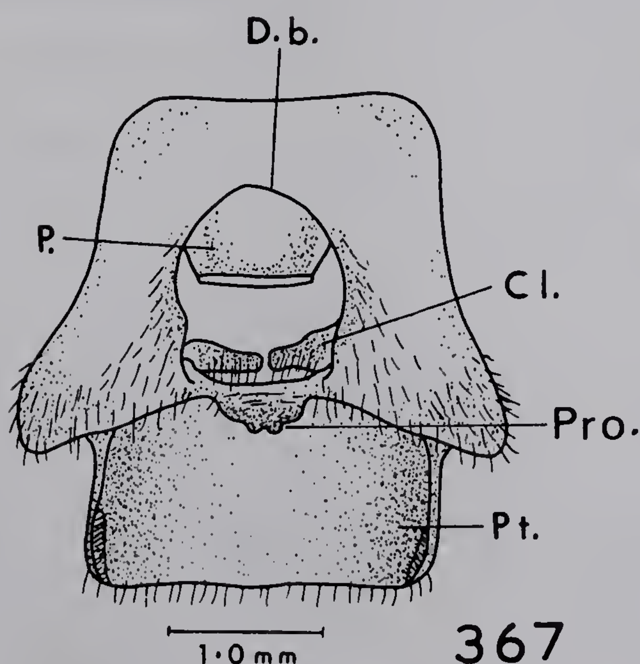

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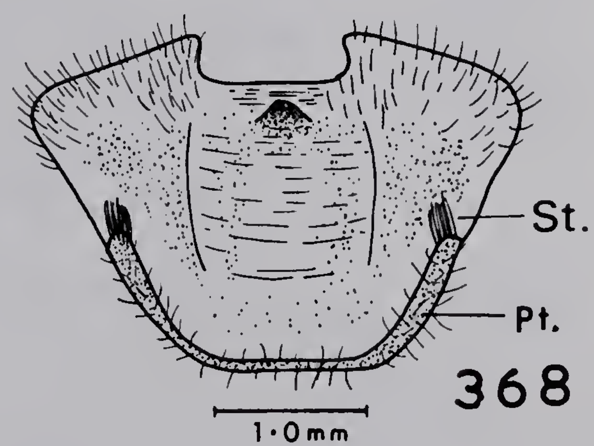

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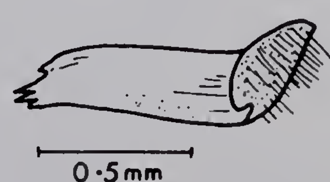


Figs. 370 - 372. _Piezosternum_ _subulatum_.

370, aedoeagus, lateral view;

371, vesica, lateral view;

372, apex of vesica.

Figs. 373 - 377. _Meadorus_ _lateralis_.

370, pygophore, dorsal view;

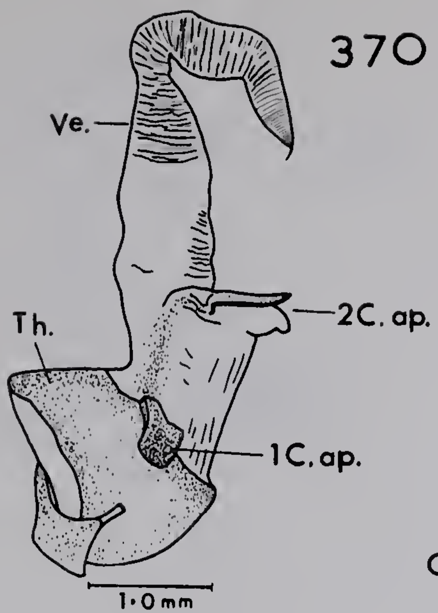
374, clasper; 375, aedoeagus, lateral view; 376, second conjunctival appendages, ventral view;

377, vesica, lateral view.

Figs. 378, 380. _Elasmostethus_ _cruciatus_.

378, pygophore, dorsal view;

379, clasper; 380, aedoeagus, lateral view.



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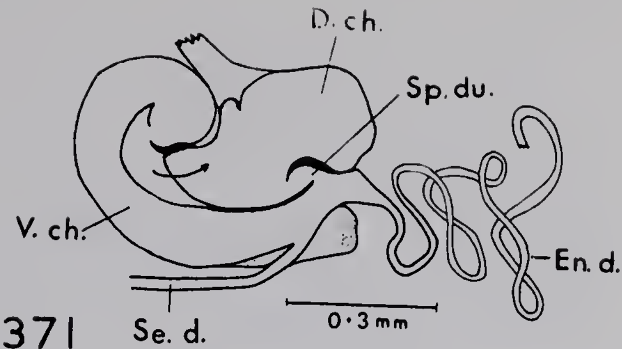

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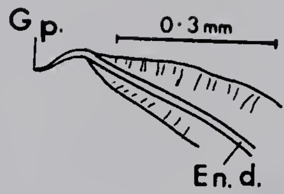

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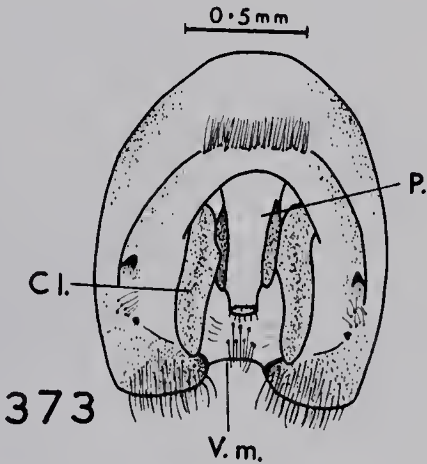

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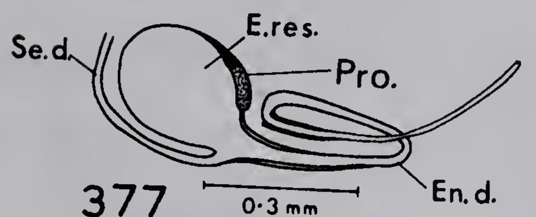

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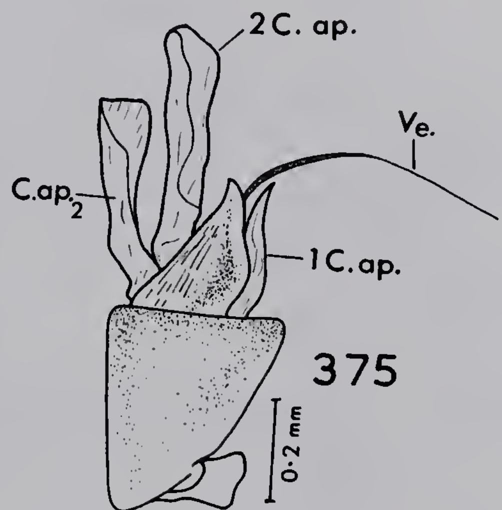

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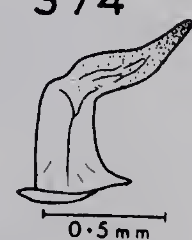

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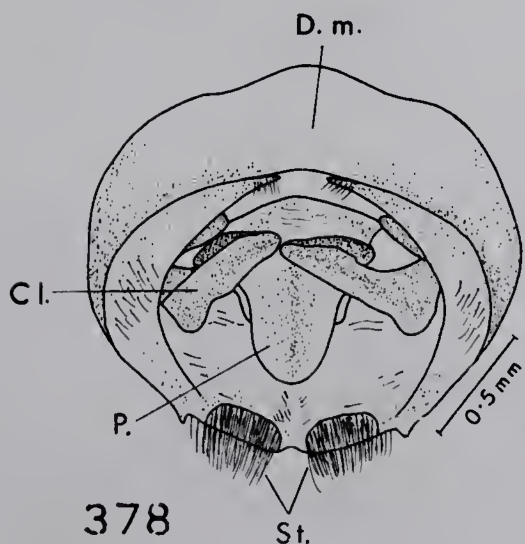

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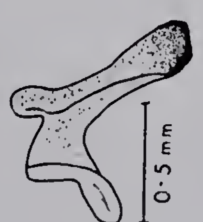

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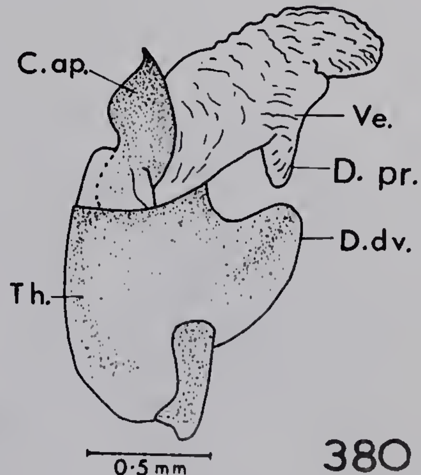

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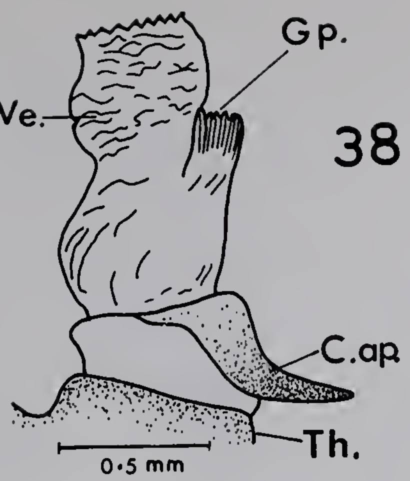
Figs. 381 - 382. *Elasmostethus cruciatus*.
381, base of vesica, lateral view;
382, vesica, lateral view.

Figs. 383 - 387. *Corimelaena pulicaria*.
383, pygophore, dorsal view;
384, clasper; 385, theca, dorsal view; 386, conjunctival appendages, lateral view; 387, vesica, lateral view.

Fig. 388. *Sehirus cinctus*, pygophore, dorsal view.



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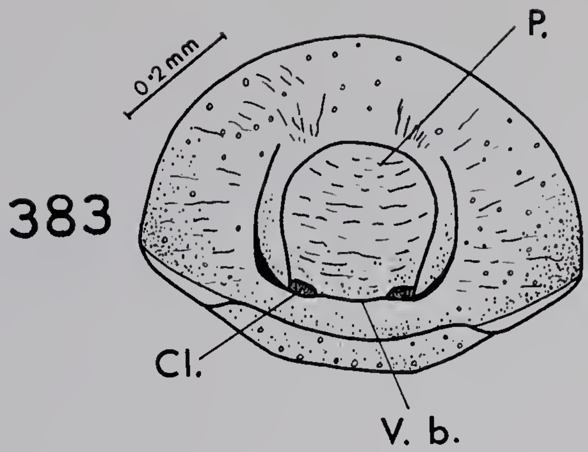

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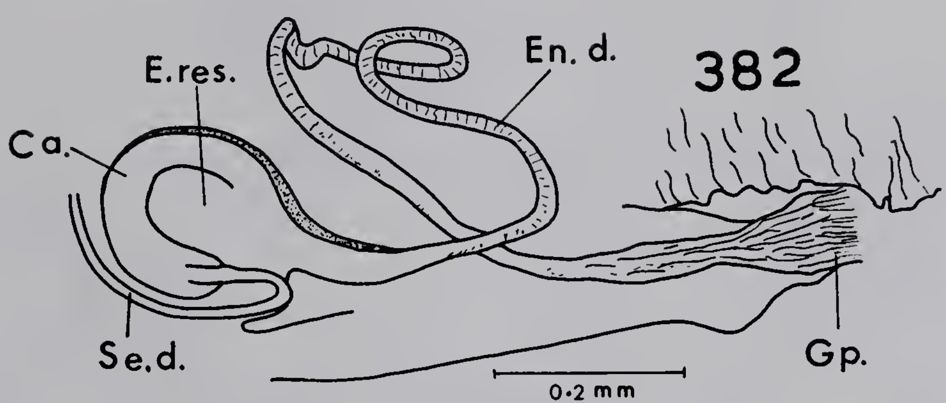

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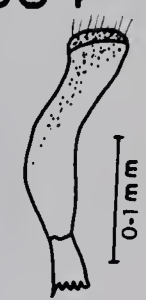

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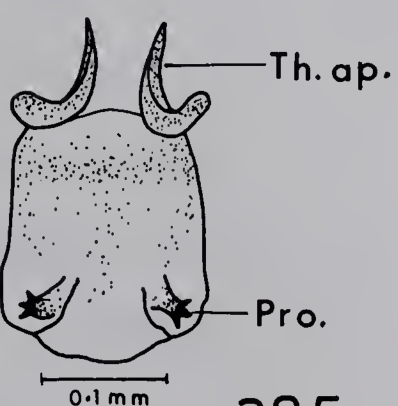

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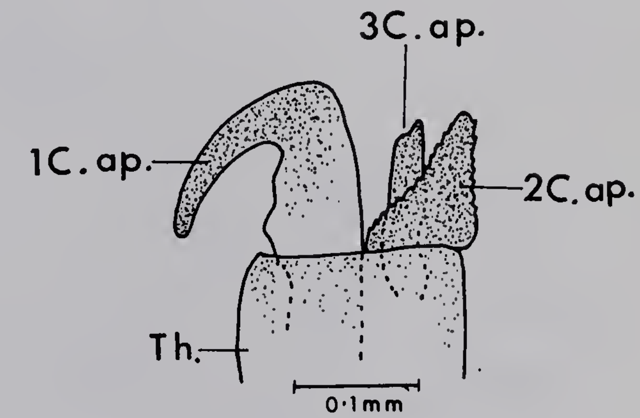

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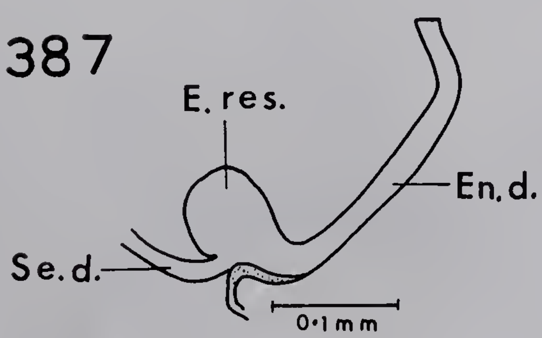

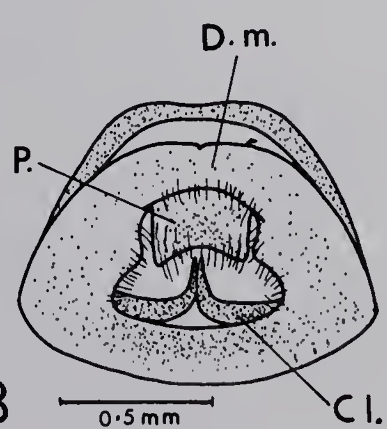

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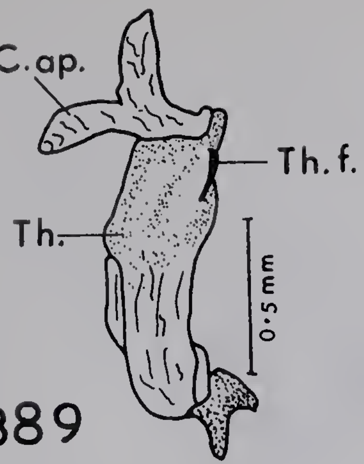
Figs. 389 - 390. *Sehirus cinctus*.

389, aedoeagus, lateral view;
390, vesica, lateral view.

Figs. 391 - 397. *Pangaeus aethiops*.

391, pygophore, dorsal view; 392, clasper; 393, clasper; 394, dorsal arm of clasper; 395, aedoeagus, lateral view; 396, apex of second conjunctival appendage, ventral view; 397, vesica, lateral view.



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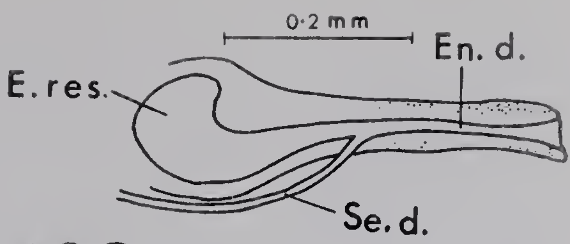

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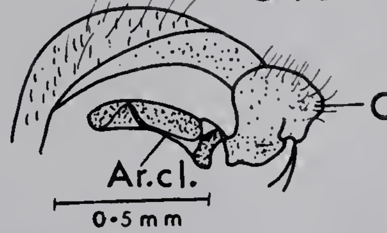

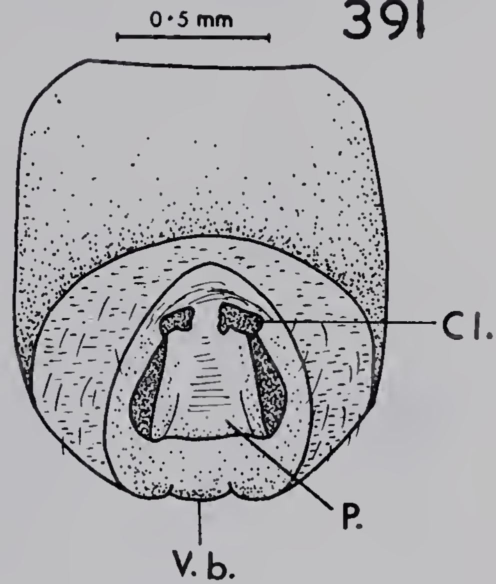

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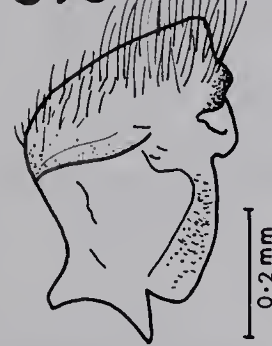

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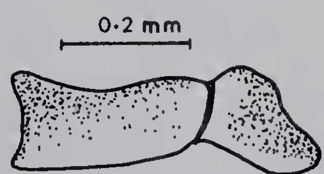

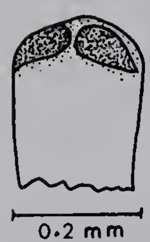

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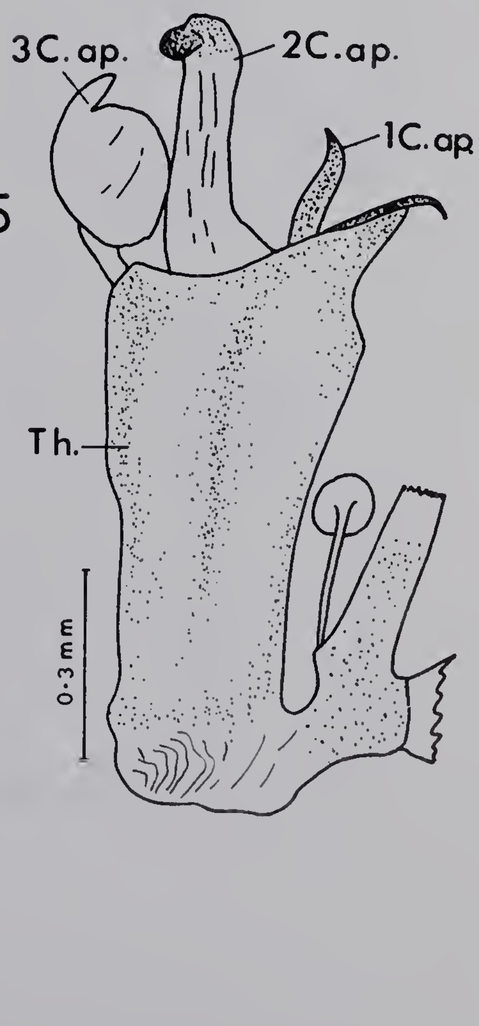

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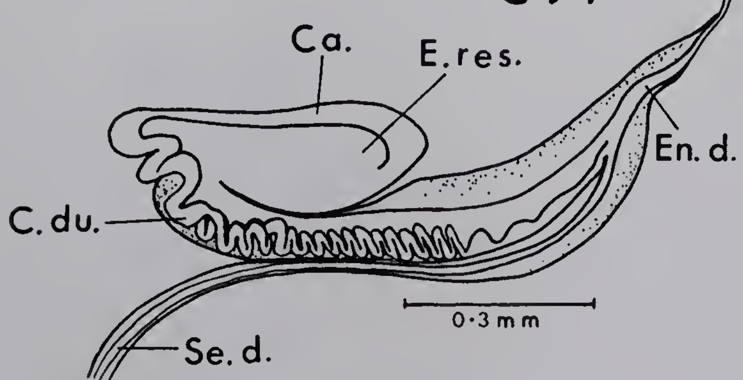


Figs. 398 - 401. Cyrtomenus crassus.

398, pygophore, dorsal view;

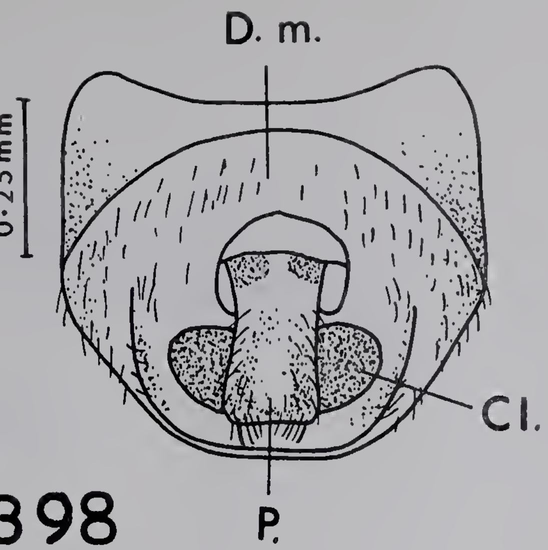
399, clasper; 400, aedoeagus, lateral view; 401, vesica, lateral view.

Figs. 402 - 404. Melanaethus subglaber.

402, pygophore, dorsal view;

403, aedoeagus, lateral view;

404, third conjunctival appendages, ventral view.



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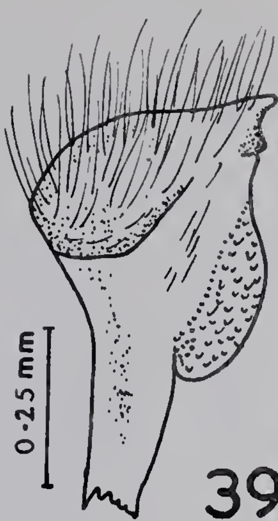

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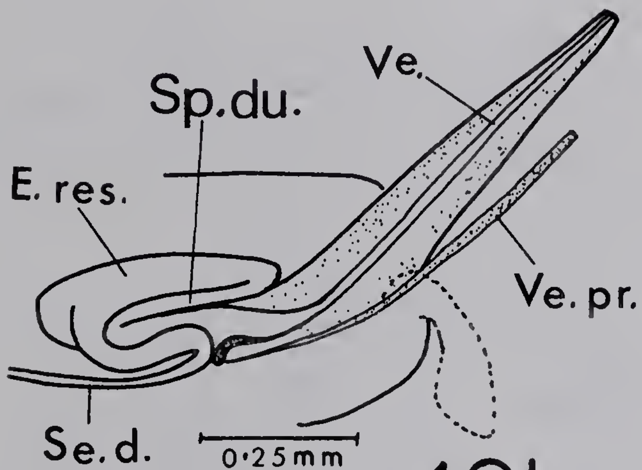

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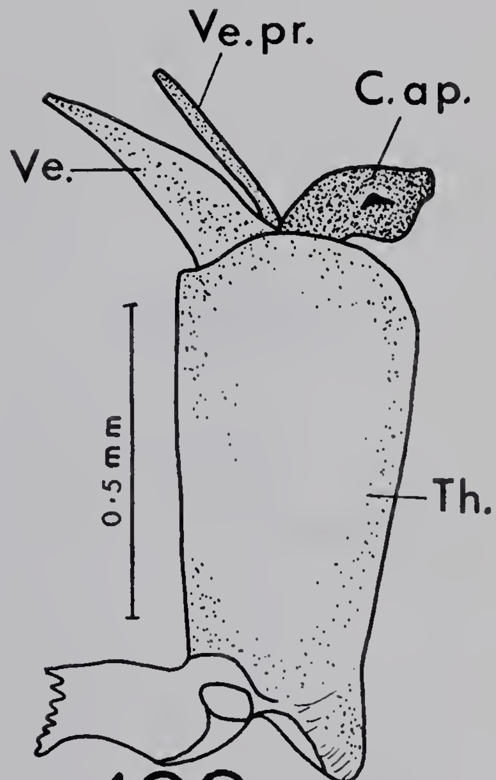

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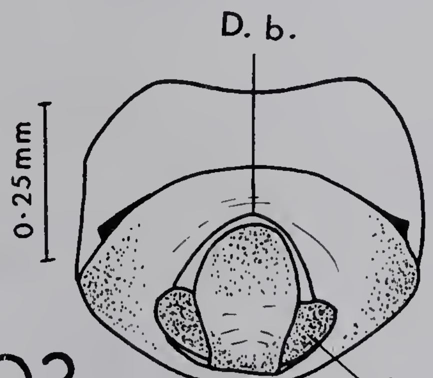

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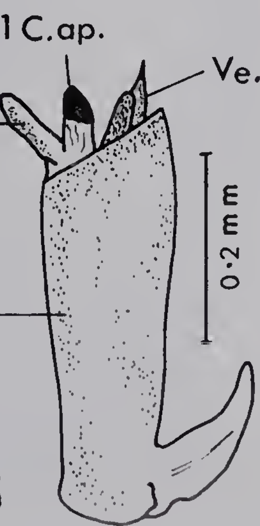

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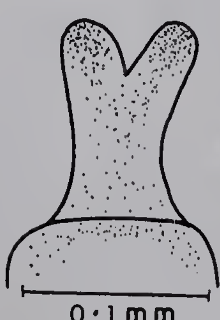

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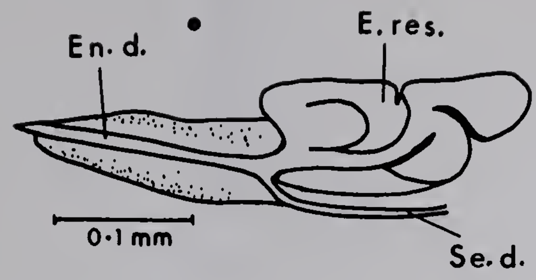
Fig. 405. _Melanaethus subglaber_, vesica, lateral view.

Figs. 406 - 410. _Amnestus pallidus_. 406, pygophore, dorsal view; 407, clasper; 408, aedoeagus, lateral view; 409, conjunctival appendages, dorsal view; 410, vesica, lateral view.



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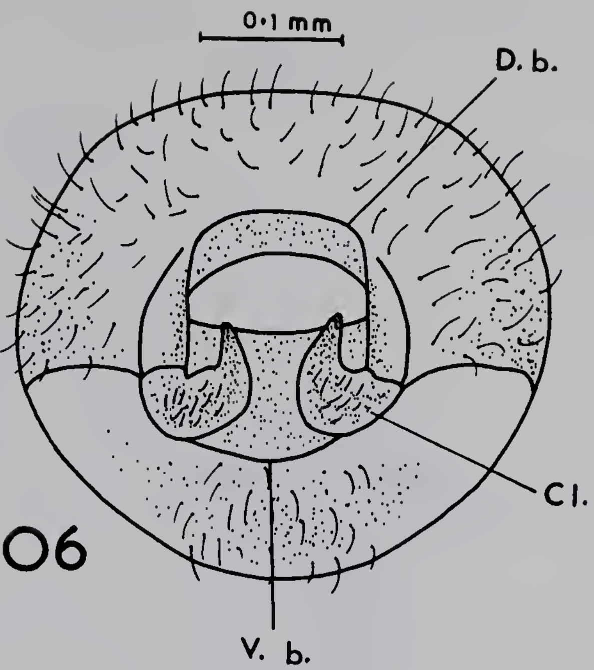

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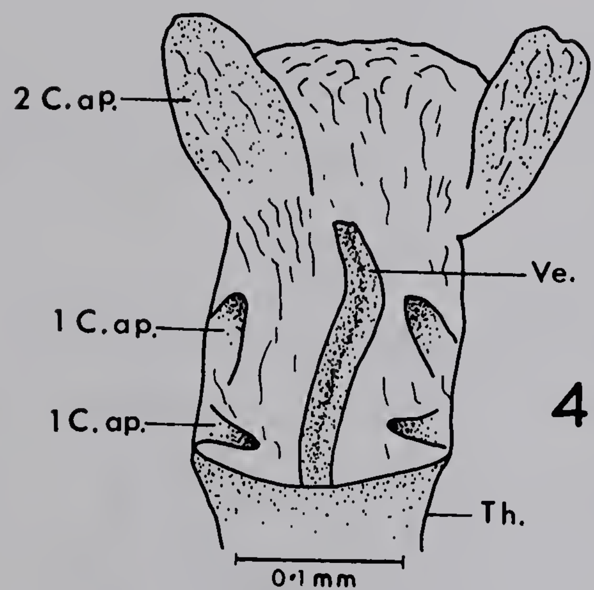

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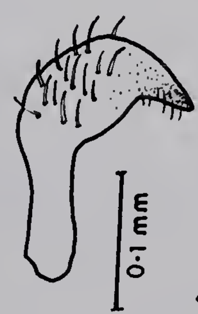

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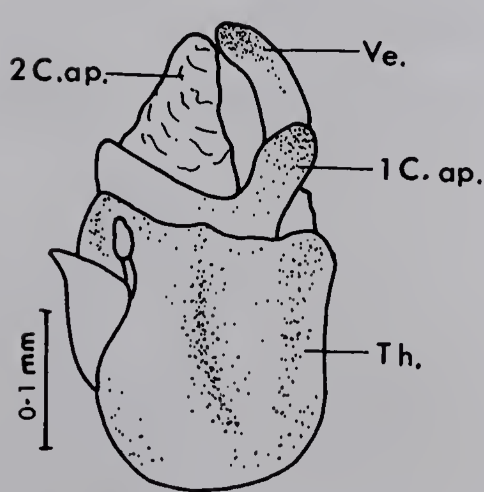

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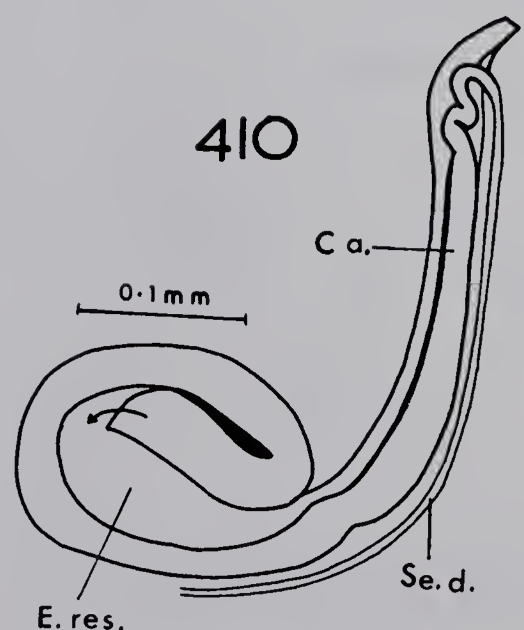


Figs. 411 - 412. <u>Fokkeria</u> <u>producta</u>.

411, genital chamber, dorsal view;

412, spermathecal bulb.

Figs. 413-414. <u>Euptychodera</u> <u>corrugata</u>.

413, genital chamber, dorsal view;

414, spermathecal bulb.

Figs. 415-416. <u>Vanduzeeina</u> <u>balli</u>.

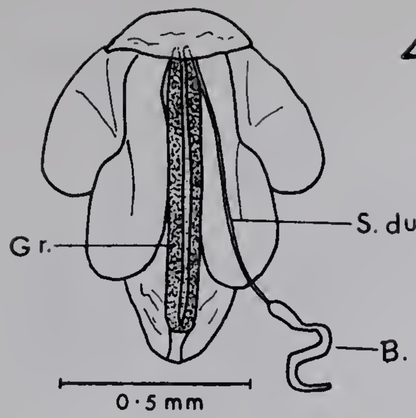
415, genital chamber, ventral view;

416, spermatheca.

Figs. 417-418. <u>Phimodera</u> <u>binotata</u>.

417, spermatheca; 418, sclerite surrounding spermathecal opening.

411



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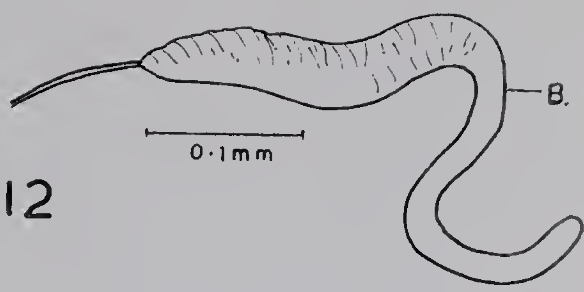

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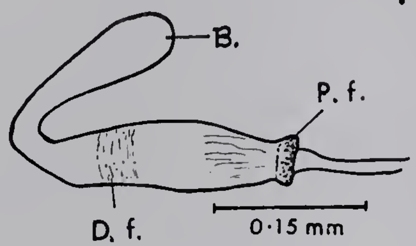

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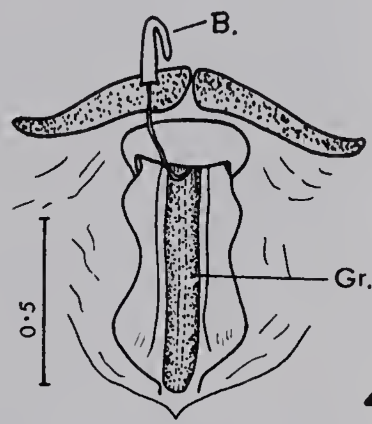

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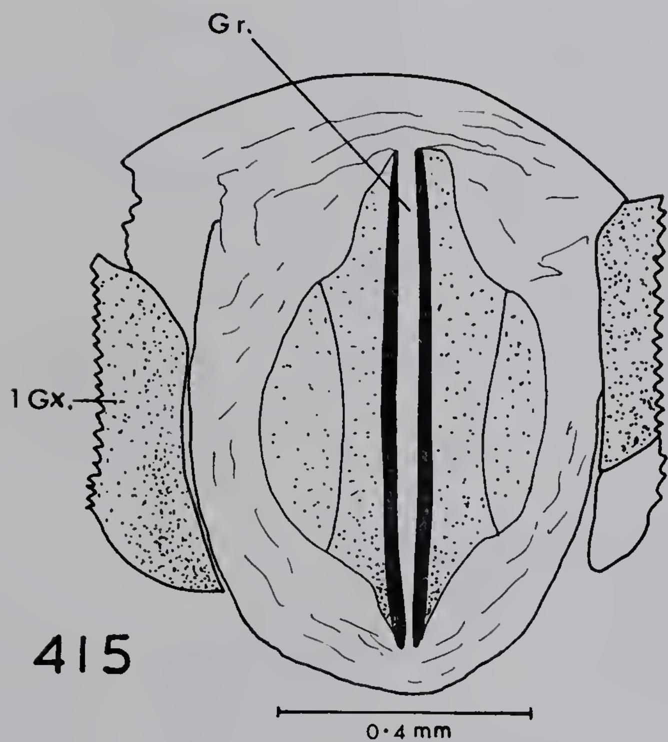

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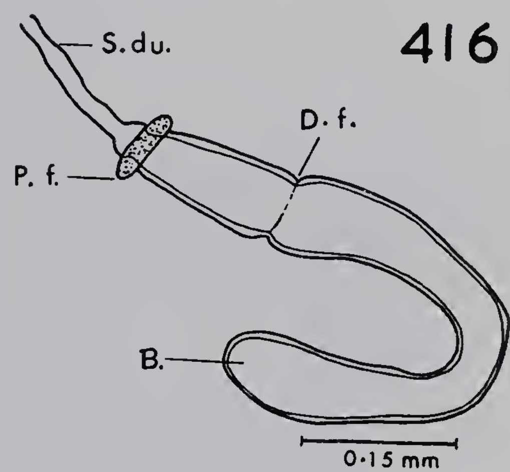

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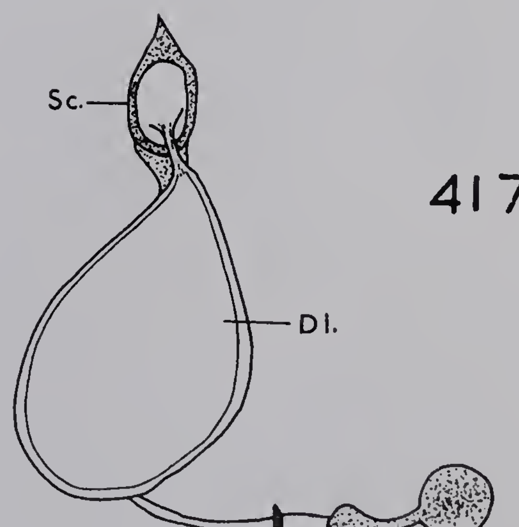

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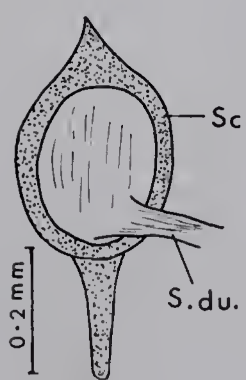


Fig. 419. _Eurygaster alternata_, spermatheca.

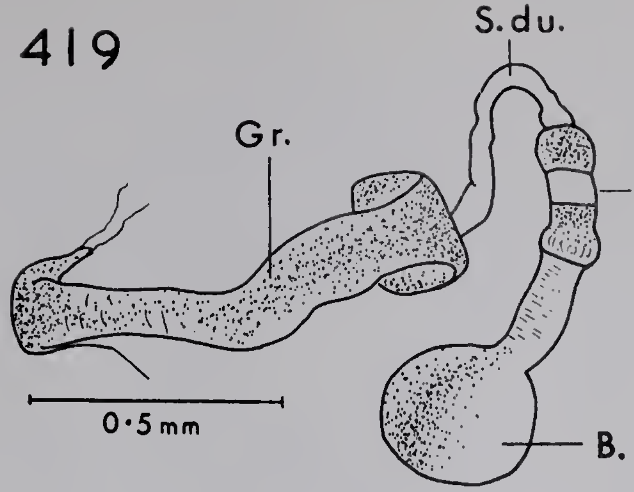
Fig. 420 - 421. _Pachycoris torridus_.

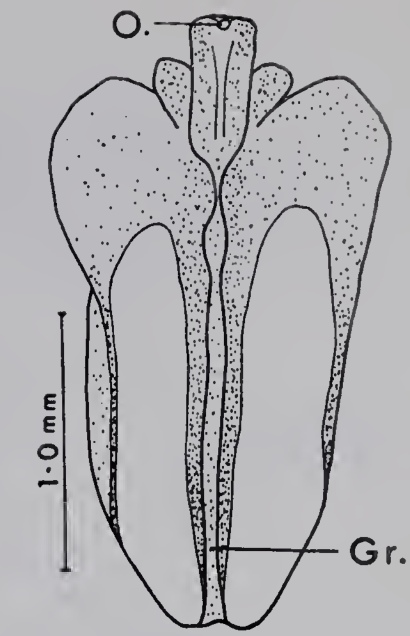
420, groove in genital chamber, dorsal view; 421, spermatheca.

Figs. 422-423. _Diolcus irroratus_.

422, pouch in genital chamber, dorsal view; 423, genital chamber, ventral view.

419





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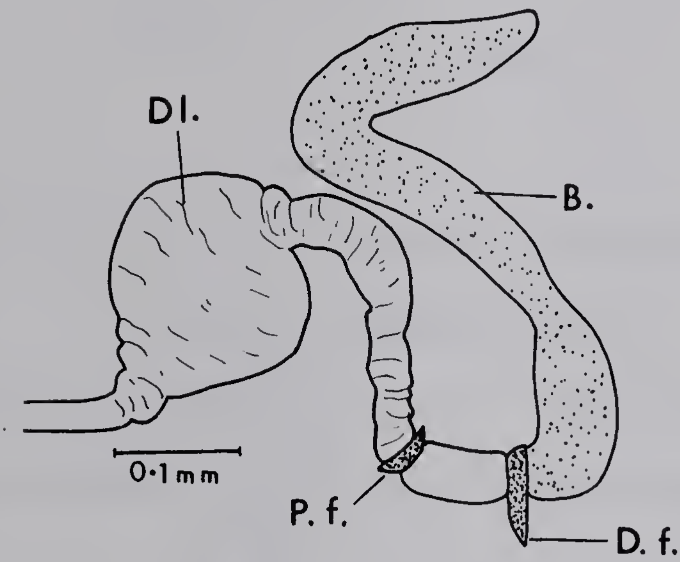

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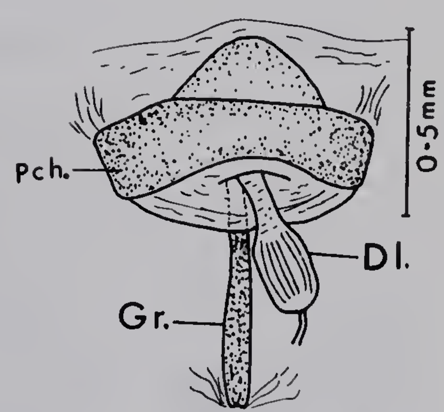

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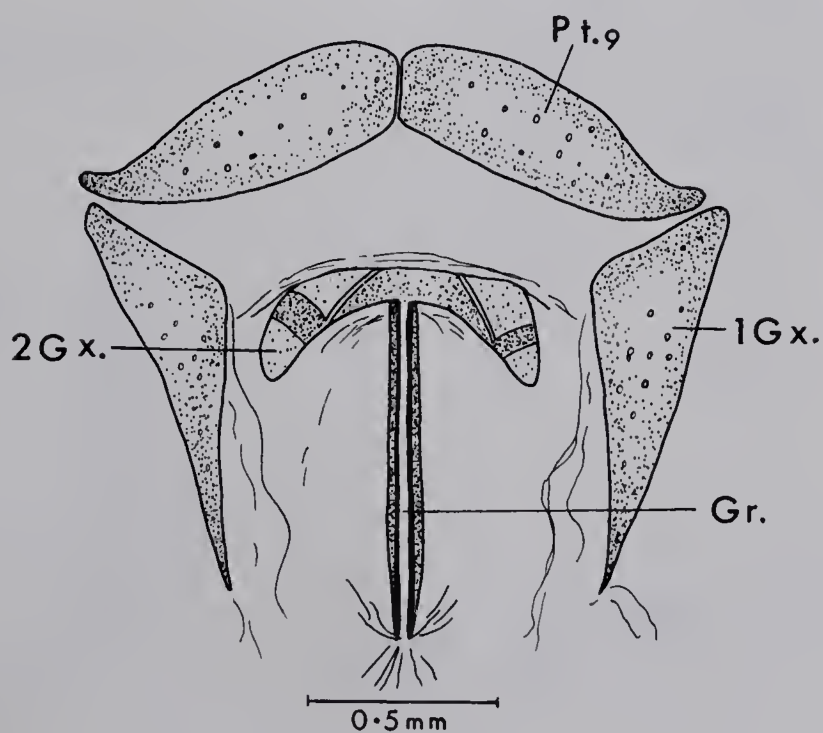

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Fig. 424. <u>Diolcus irroratus</u>, spermatheca.

Figs. 425 - 427. <u>Tetyra</u> <u>antillarum</u>.

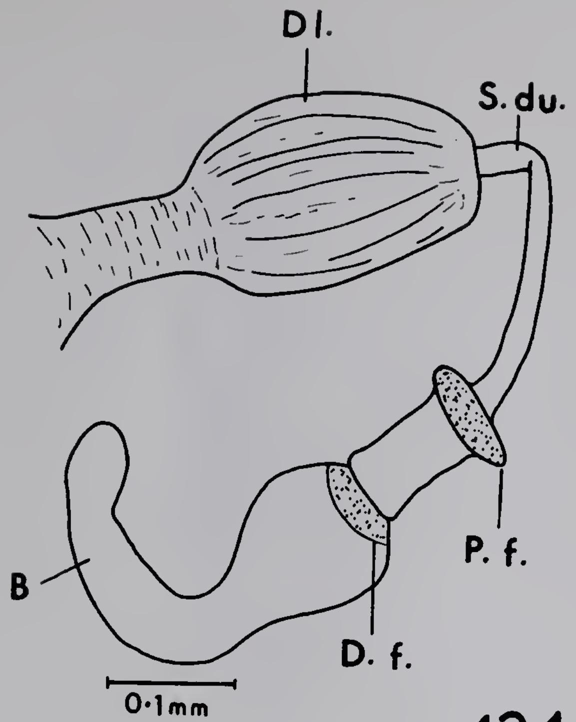
425, ventral view of female genitalia; 426, spermatheca; 427, spermathecal bulb.

Fig. 428. <u>Symphylus</u> <u>carribeanus</u>, spermatheca.

Figs. 429 - 430. <u>Sphyrocoris</u> <u>obliquus</u>.

429, spermatheca;

430, spermathecal bulb.



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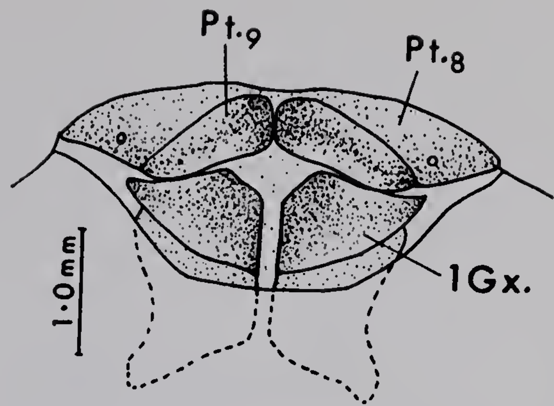

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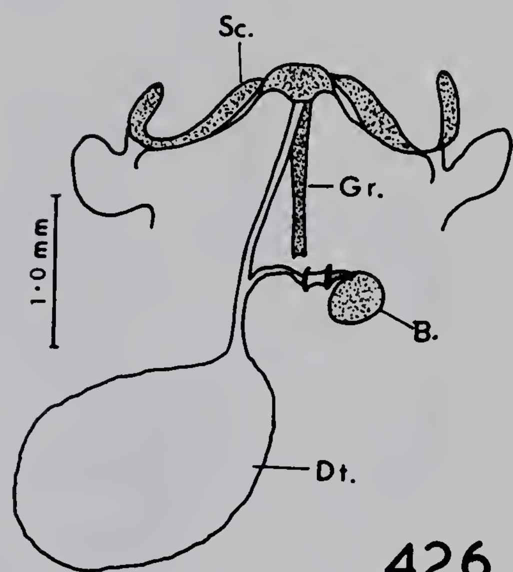

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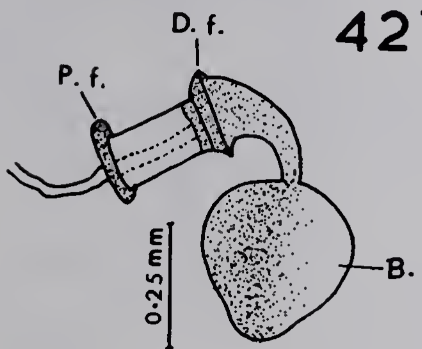

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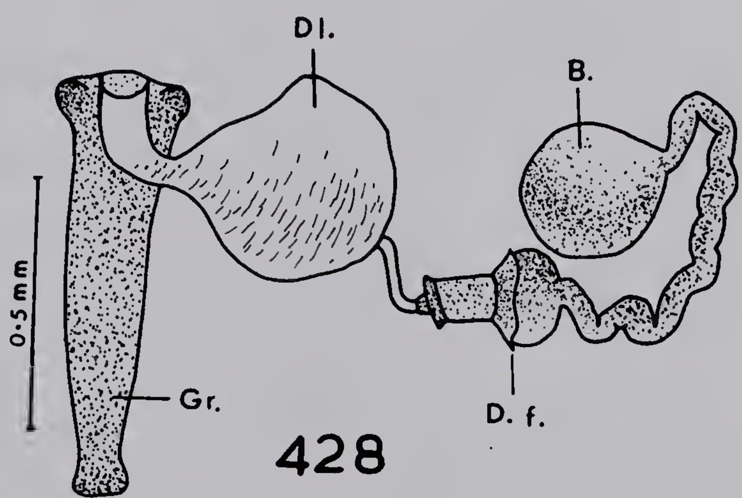

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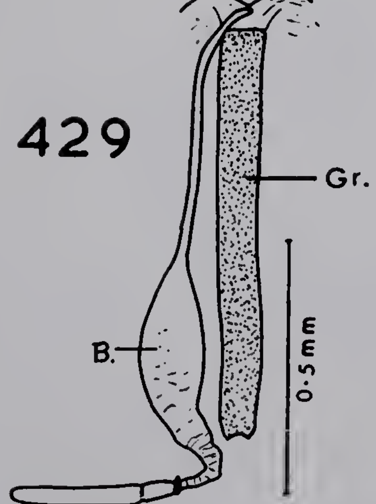

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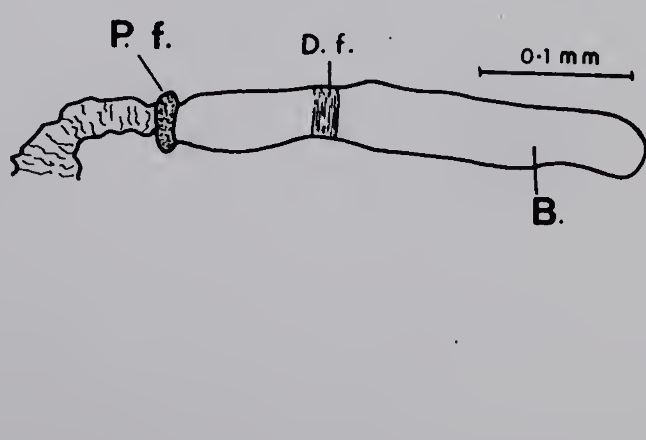


Figs. 431 - 432. <u>Homaemus aeneifrons</u>.

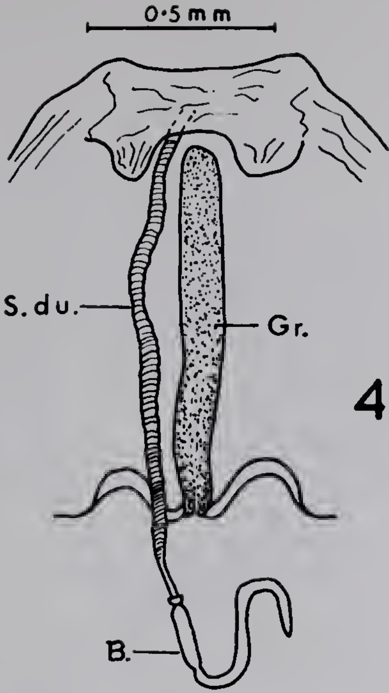
431, spermatheca; 432, spermathecal bulb.

Figs. 433- 435. <u>Acantholomidea porosa</u>.

433, genital chamber, ventral view; 434, spermatheca; 435, spermathecal bulb.

Figs. 436 - 437. <u>Chelysomidea guttata</u>.

436, genital chamber, ventral view; 437, pouch of genital chamber, dorsal view.



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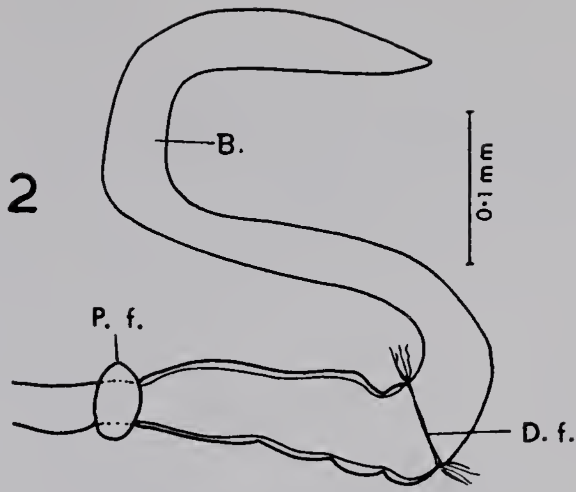

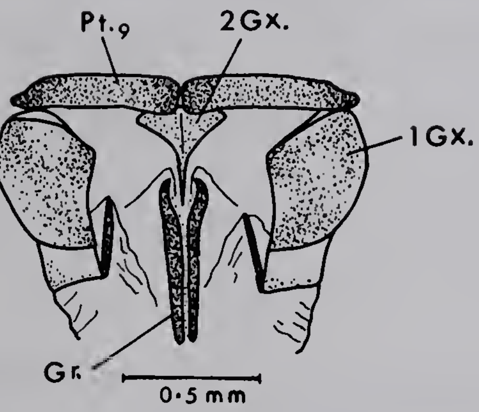

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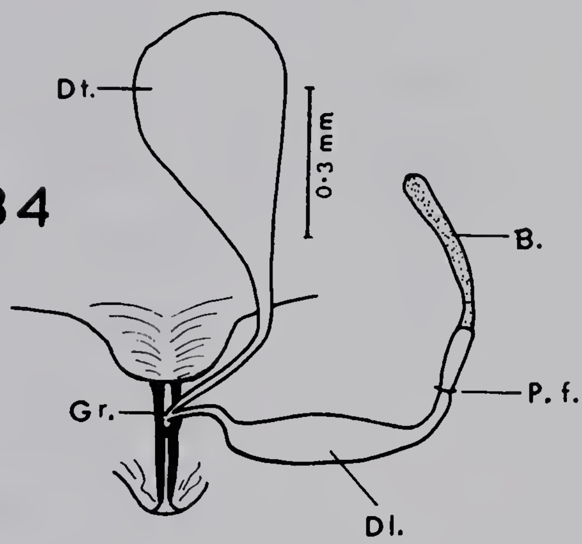

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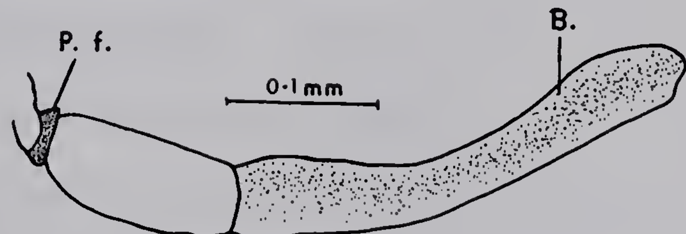

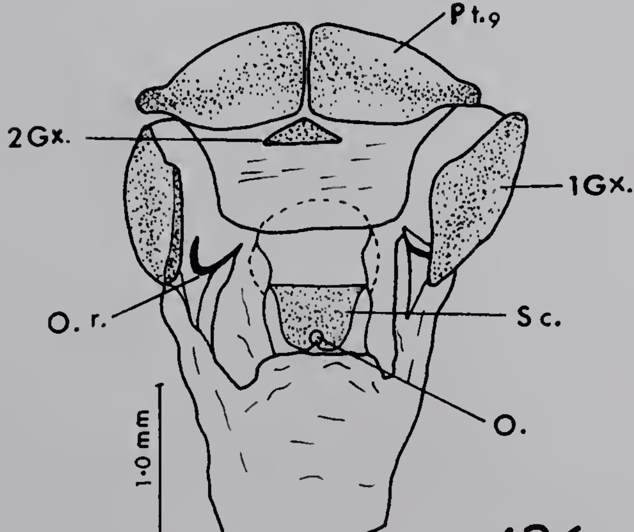

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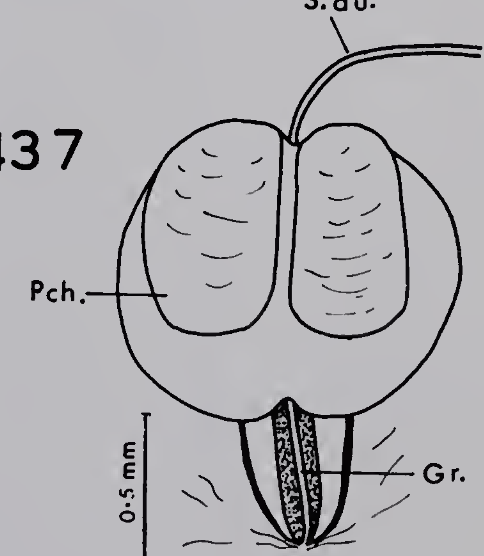


Fig. 438. *Chelysomidea guttata*, spermatheca.

Figs. 439 - 442. *Stethaulax marmoratus*.

439, female genitalia, ventral view; 440, groove in genital chamber, dorsal view; 441, spermatheca; 442, spermathecal bulb.

Fig. 443. *Augocoris gomesii*, spermatheca.

Figs. 444 - 445. *Rhytidolomia senilis*.

444, sclerites surrounding opening of spermathecal duct; 445, spermathecal bulb.

Fig. 438. _Chelysomidea guttata_, spermatheca.

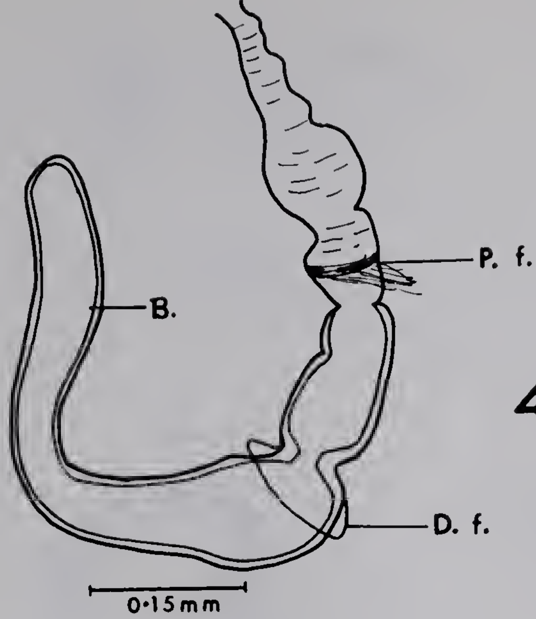
Figs. 439 - 442. _Stethaulax marmoratus_.

439, female genitalia, ventral view; 440, groove in genital chamber, dorsal view; 441, spermatheca; 442, spermathecal bulb.

Fig. 443. _Augocoris gomesii_, spermatheca.

Figs. 444 - 445. _Rhytidolomia senilis_.

444, sclerites surrounding opening of spermathecal duct; 445, spermathecal bulb.



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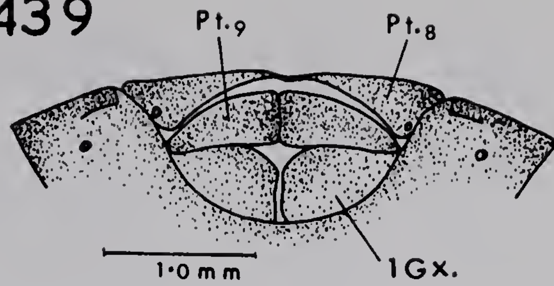

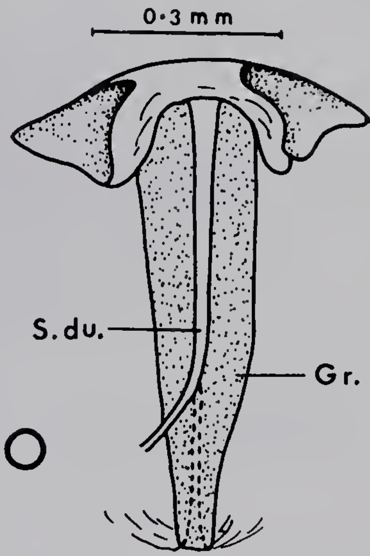

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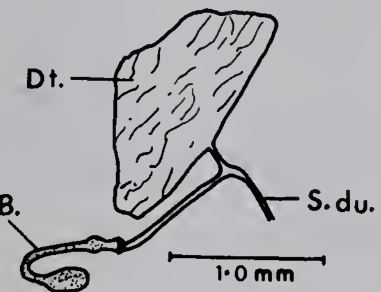

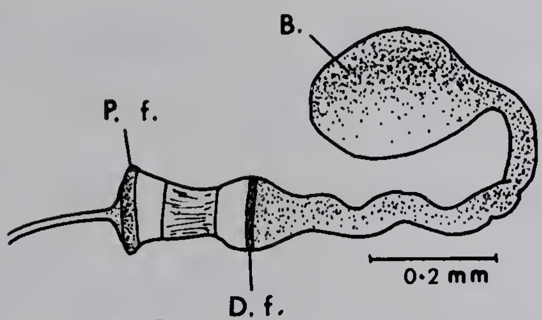

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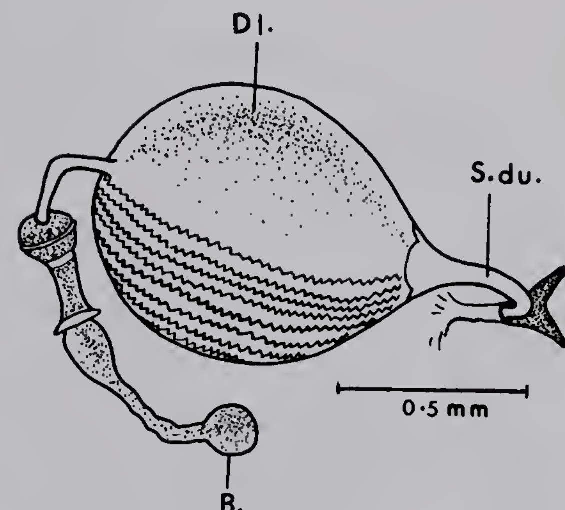

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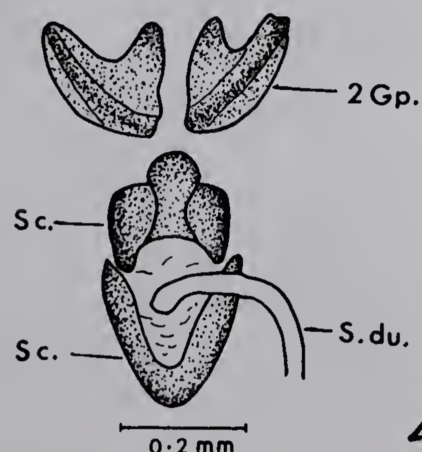

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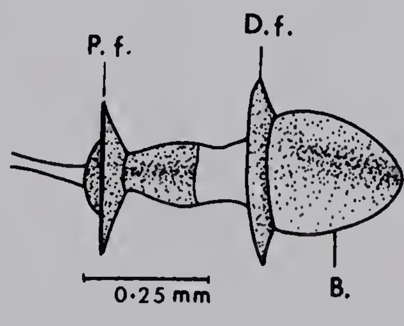


Fig. 446. _Rhytidolomia viridicata_, spermathecal bulb.

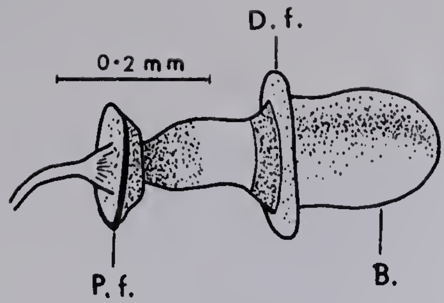
Fig. 447. _Banasa dimidiata_, spermathecal bulb.

Fig. 448. _Carpocoris remotus_, spermatheca.

Figs. 449 - 450. Murgantia histrionica. 449, female genitalia, ventral view; 450, sclerites surrounding opening of spermathecal duct.

Fig. 451. _Solubea pugnax_, spermatheca.

Fig. 452. _Euschistus tristigmus_, spermatheca.



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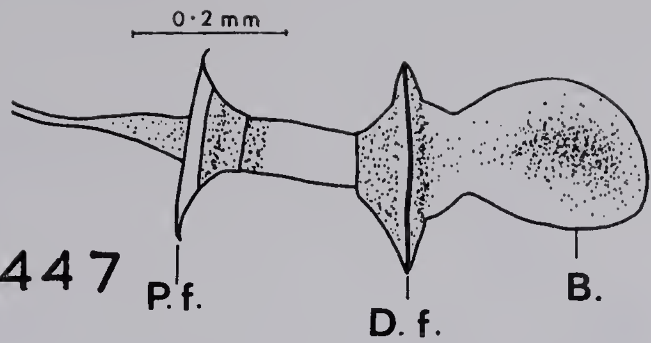

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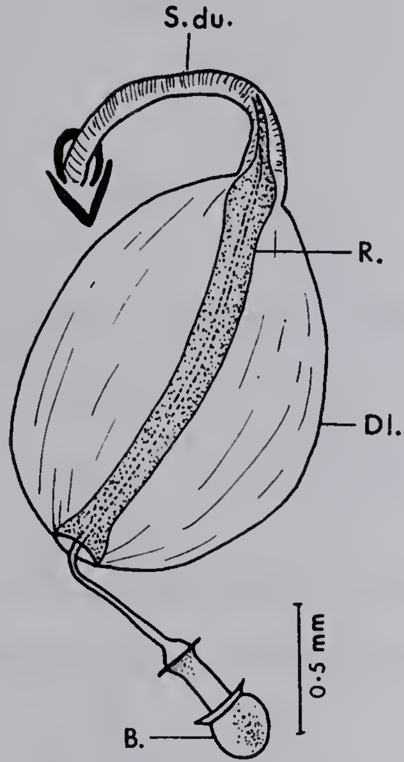

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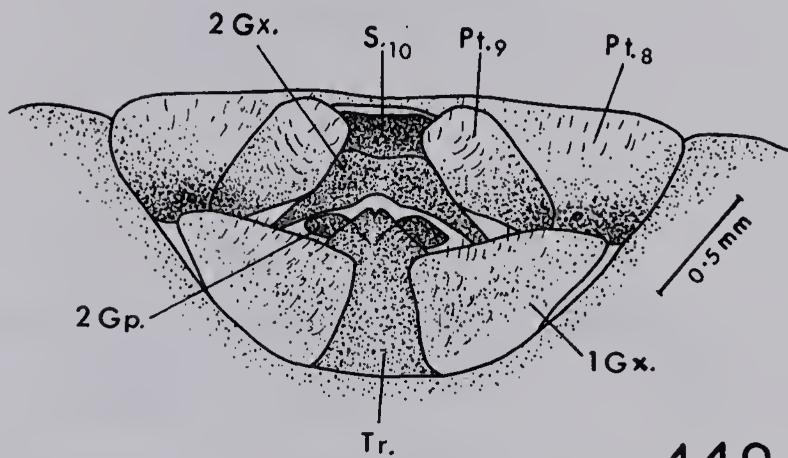

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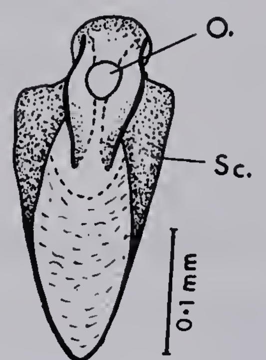

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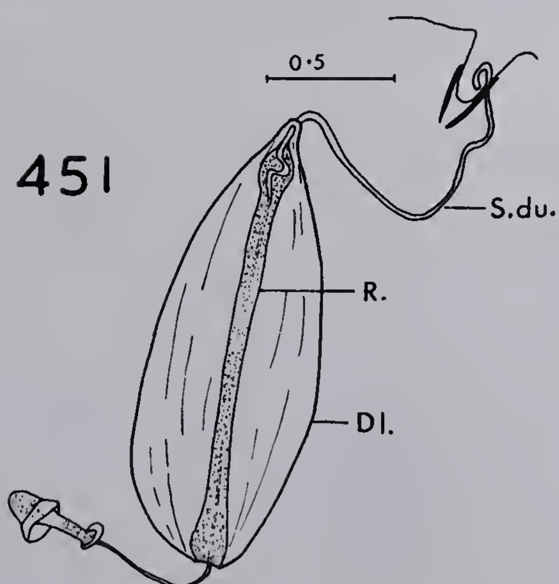

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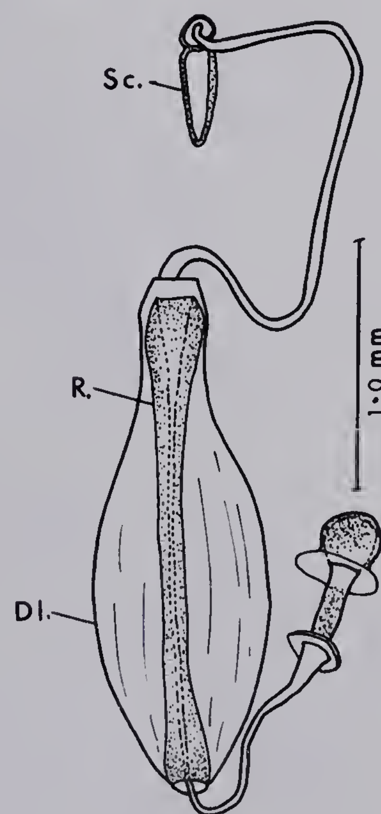

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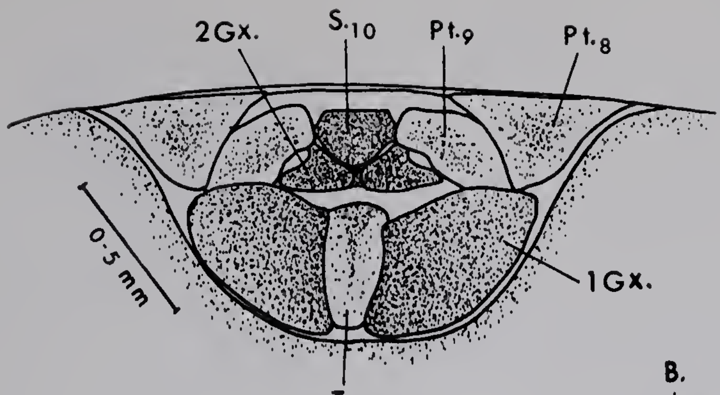
Figs. 453 - 454. Cosmopepla bimaculata.
453, female genitalia, ventral view;
454, spermatheca.

Figs. 455 - 456. Brepholoxa heidmanni.
455, spermatheca; 456, spermathecal bulb.

Fig. 457. Dendrocoris humeralis, female genitalia, ventral view.

Fig. 458 - 459. Prionosoma podopioides.
458, spermatheca; 459, spermathecal bulb.

Fig. 460. Solubea pugnax, female genitalia, ventral view.



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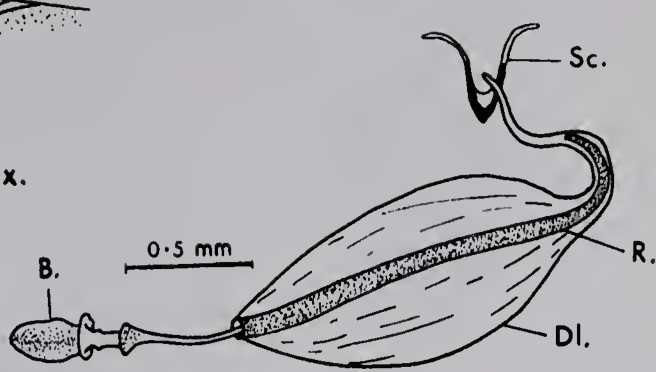

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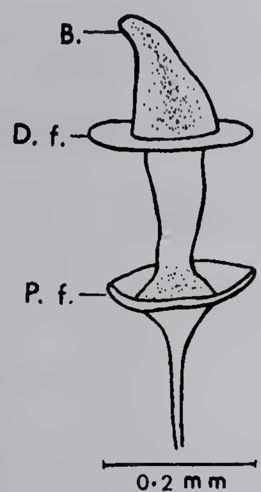

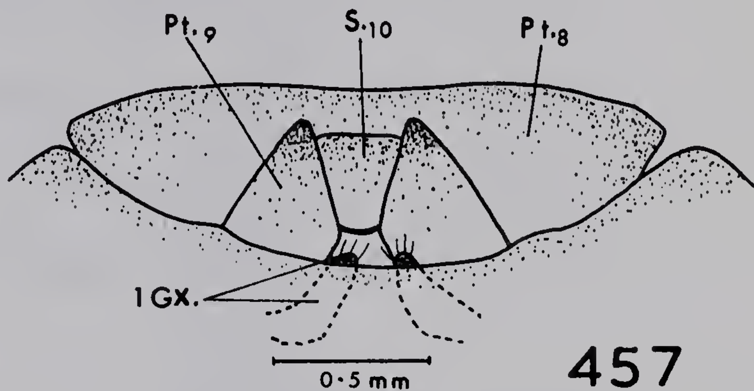

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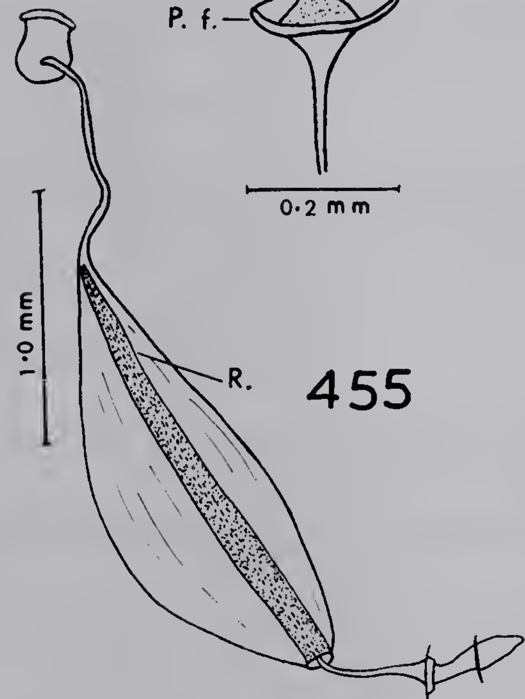

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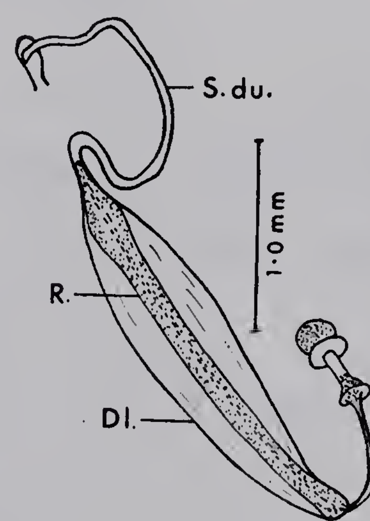

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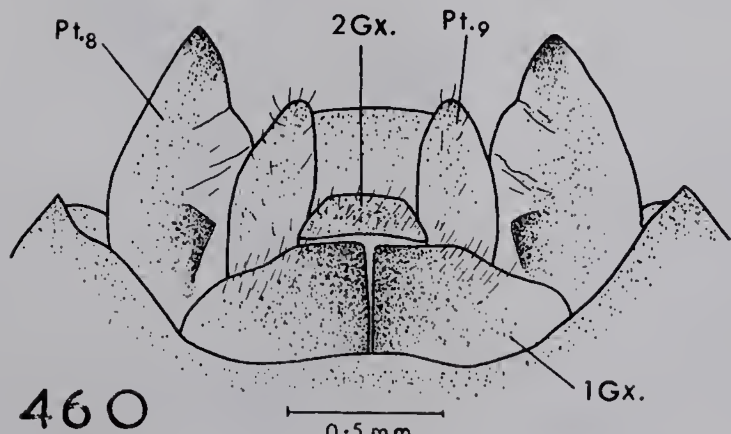

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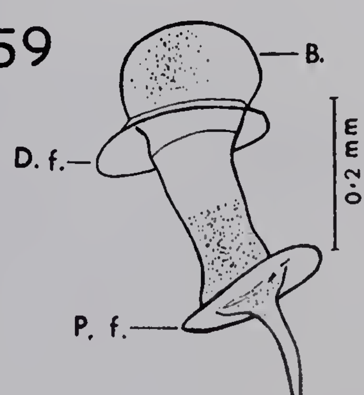


Fig. 461. _Solubea pugnax_, spermathecal bulb.

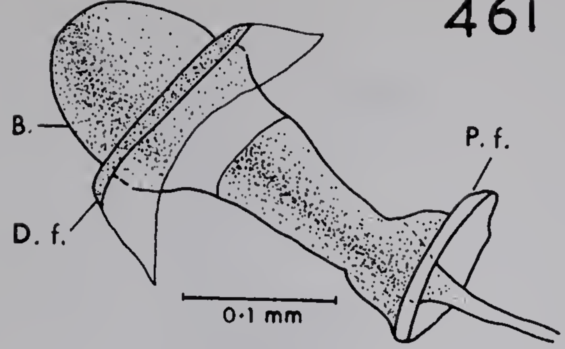
Fig. 462. _Neottiglossa trilineata_, sclerites around spermathecal opening.

Fig. 463. _Loxa flavicollis_, spermathecal bulb.

Figs. 464 - 465. _Arvelius albopunctatus_. 464, spermatheca; 465, spermathecal bulb.

Fig. 466. _Aelia americana_, spermathecal bulb.

Figs. 467 - 468. _Acrosternum pensylvannicum_. 467, female genitalia, ventral view; 468, spermatheca.



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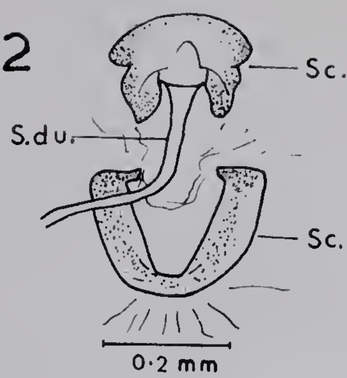

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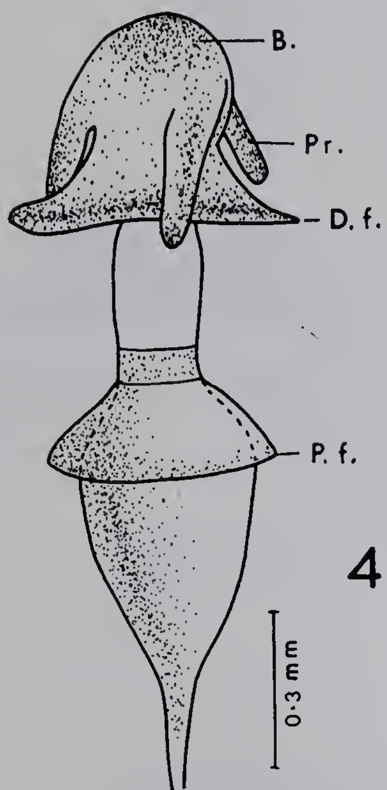

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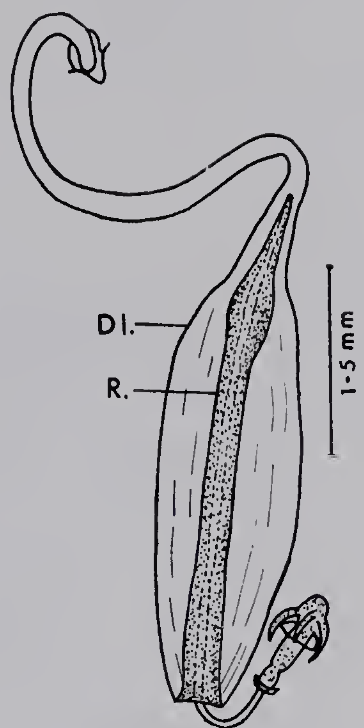

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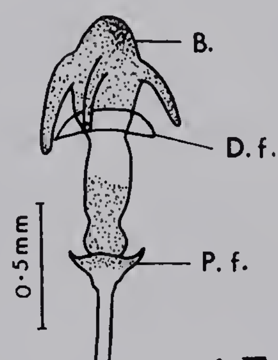

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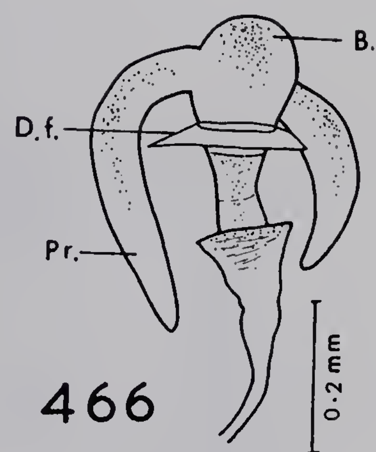

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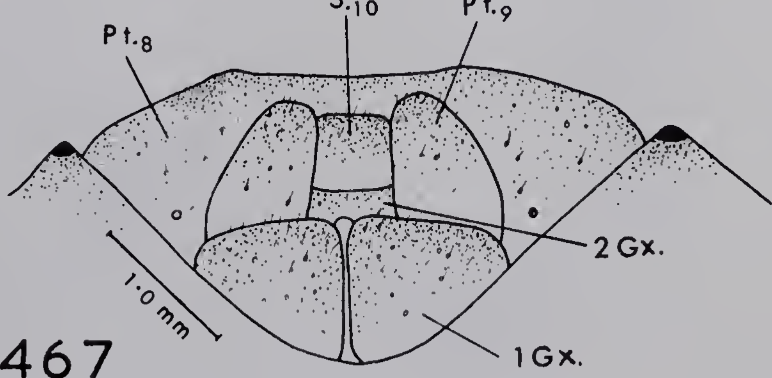

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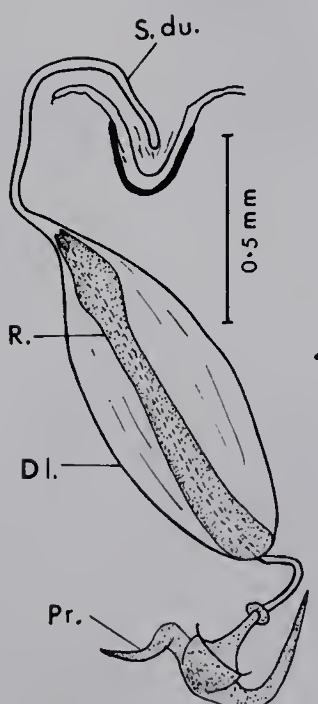

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Figs. 469 - 470. Peribalus limbolarius.

469, spermatheca; 470, spermathecal bulb.

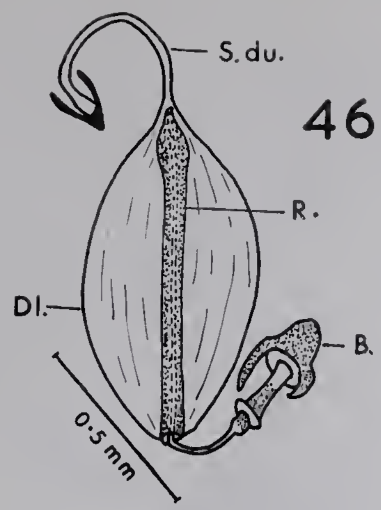
Figs. 471 - 472. Vulsirea violacea.

471, female genitalia, ventral view; 472, spermatheca.

Figs. 473 - 474. Pentatoma rufipes.

473, female genitalia, ventral view; 474, spermatheca.

Fig. 475. Chlorocoris subrugosus, spermathecal bulb.



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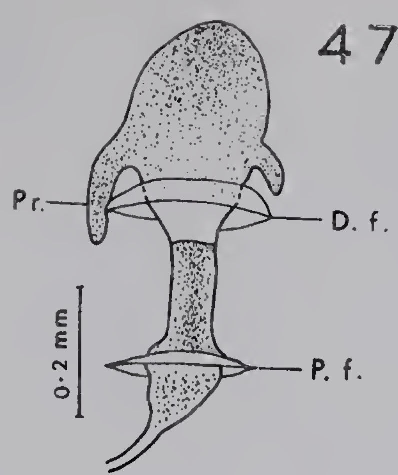

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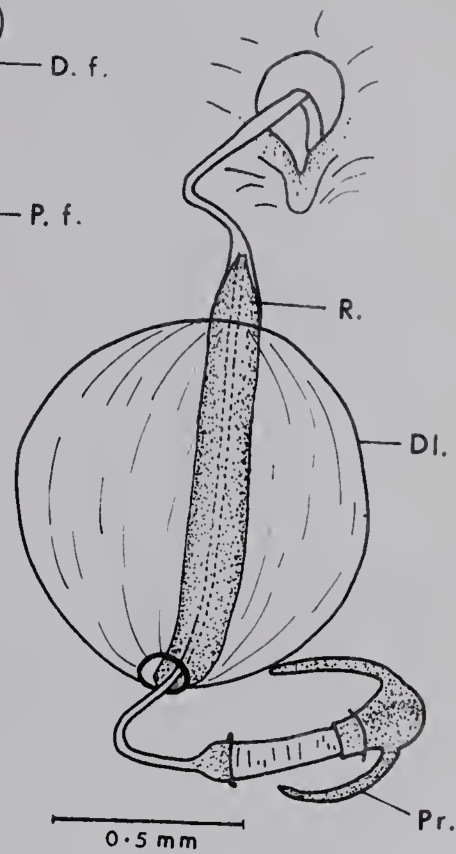

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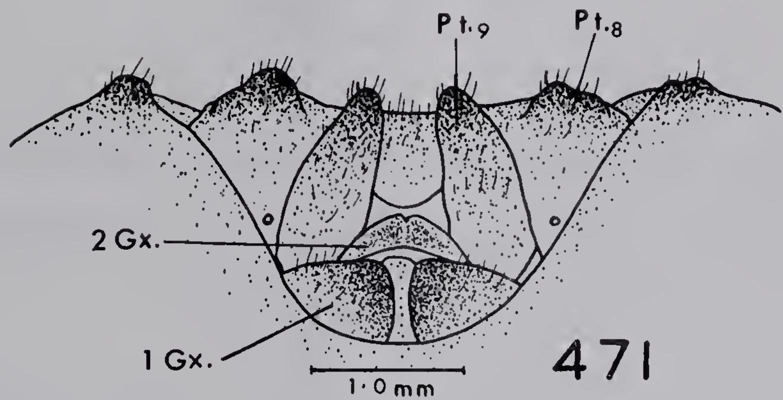

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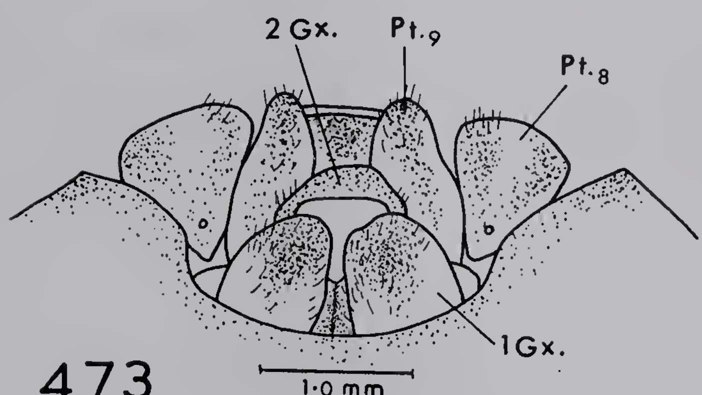

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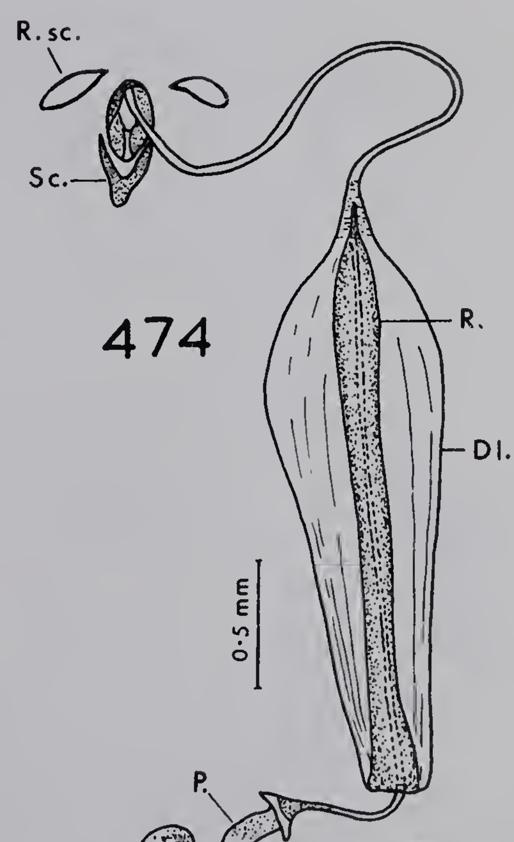

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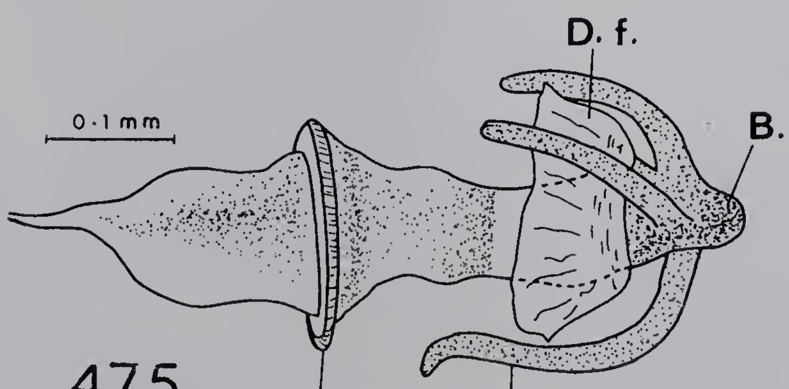

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Fig. 476. _Trichopepla semivittata_, spermatheca.

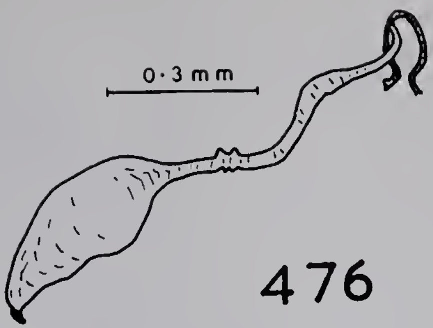
Fig. 477. _Proxys punctulatus_, spermatheca.

Figs. 478 - 479. _Thyanta perditor_.

478, spermatheca; 479, spermathecal bulb.

Fig. 480. _Eysarcoris aeneus_, spermatheca.

Fig. 481. _Brochymena quadripustulata_, spermatheca.



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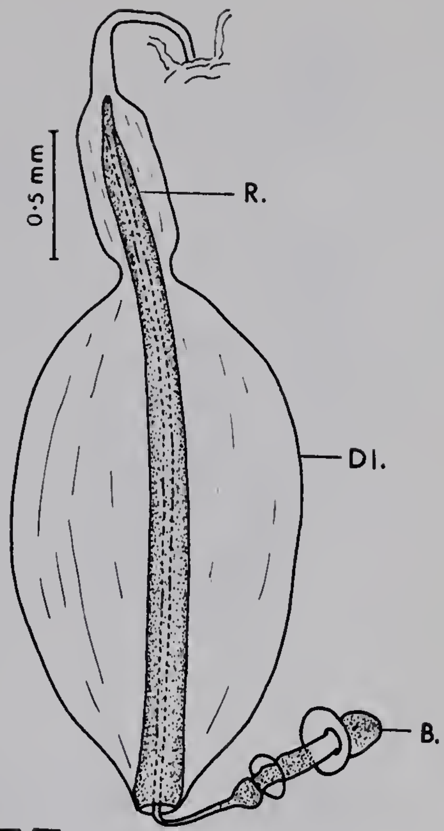

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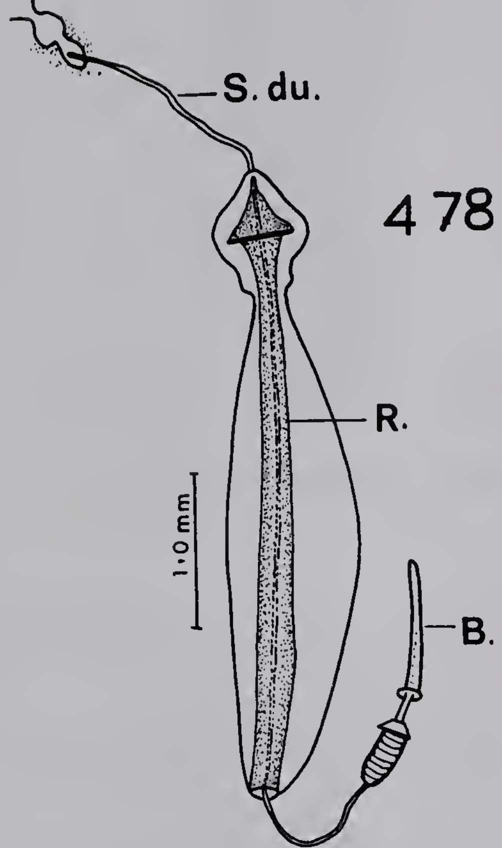

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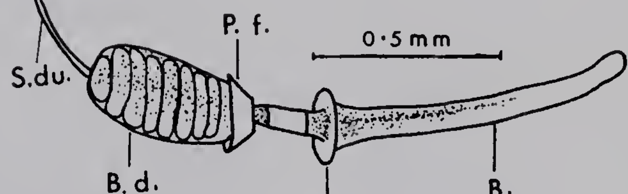

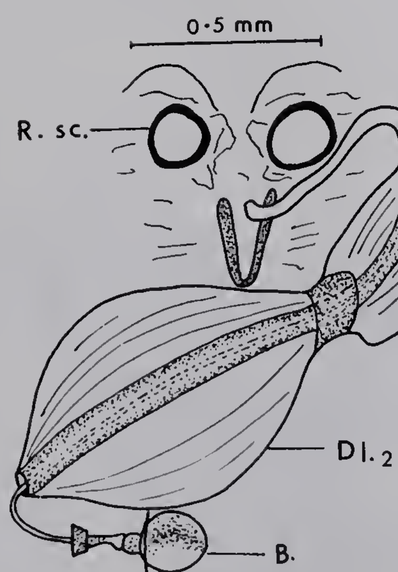

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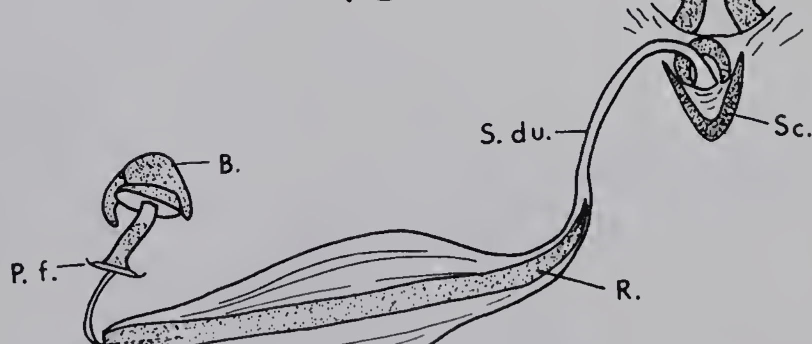

Fig. 482. *Edessa bifida*, spermatheca.

Fig. 483. *Sciocoris micropthalmus*, spermatheca.

Fig. 484. *Lineostethus clypeatus*, spermatheca.

Fig. 484. *Mecidea longula*, female genitalia, ventral view.

Figs. 486 - 487. *Mineus strigipes*.
486, female genitalia, ventral view;
487, spermathecal bulb.

Fig. 488. *Rhacognathus americanus*, spermatheca.

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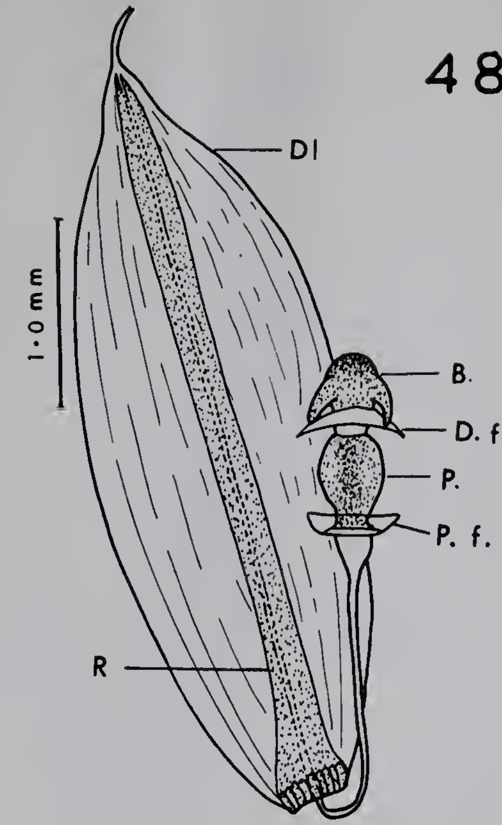

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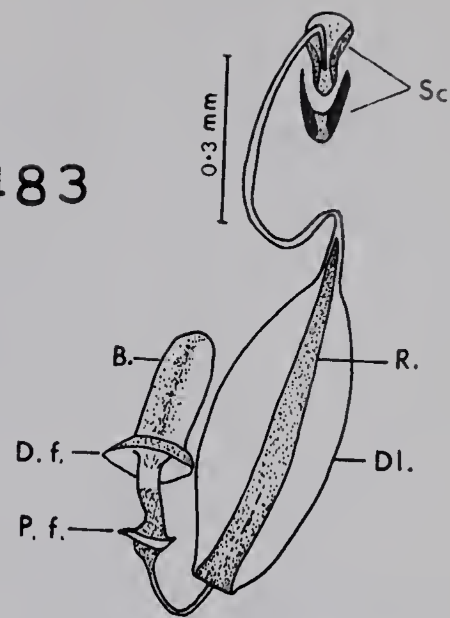

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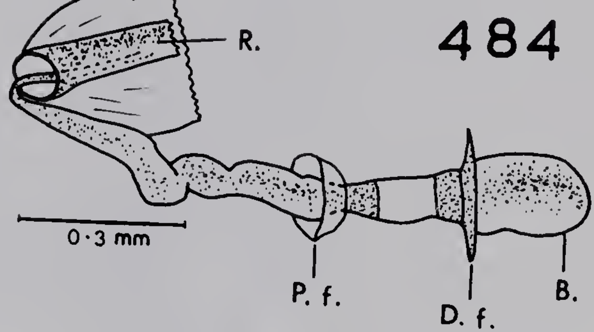

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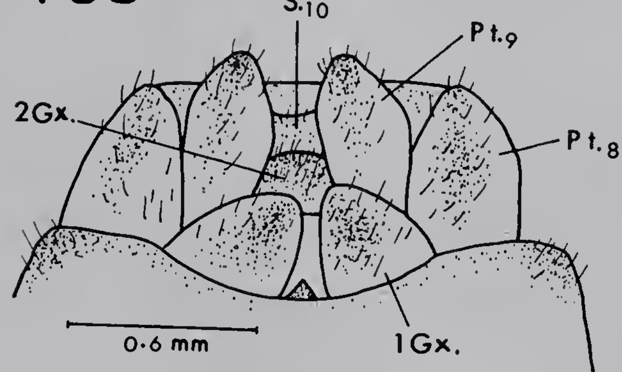

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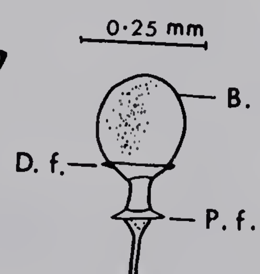

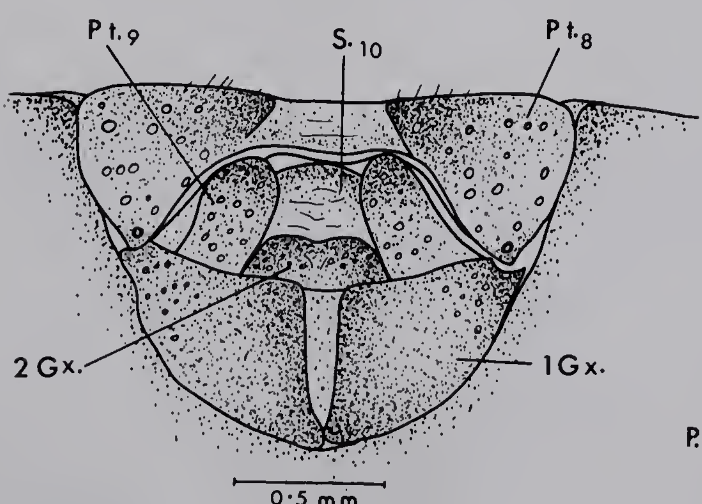

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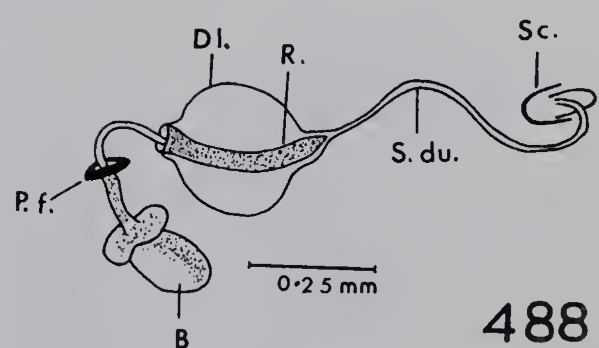

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Figs. 489 - 490. *Podisius acutissimus*.
489, spermatheca; 490, spermathecal bulb.

Fig. 491. *Podisius maculiventris*, spermathecal bulb.

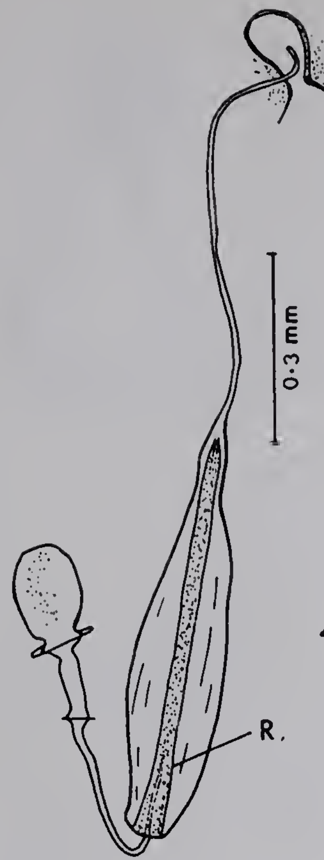
Fig. 492. *Apateticus lineolatus*, spermatheca.

Fig. 493. *Perillus confluens*, spermatheca.

Fig. 494. *Acaeorhynchus grandis*, spermathecal bulb.

Fig. 495. *Euthyrhynchus floridanus*, spermatheca.

Fig. 496. *Zicrona caerulea*, female genitalia, ventral view.



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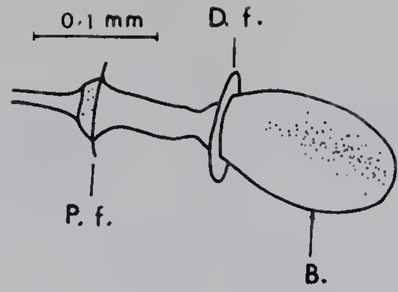

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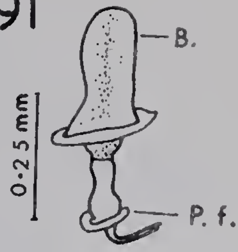

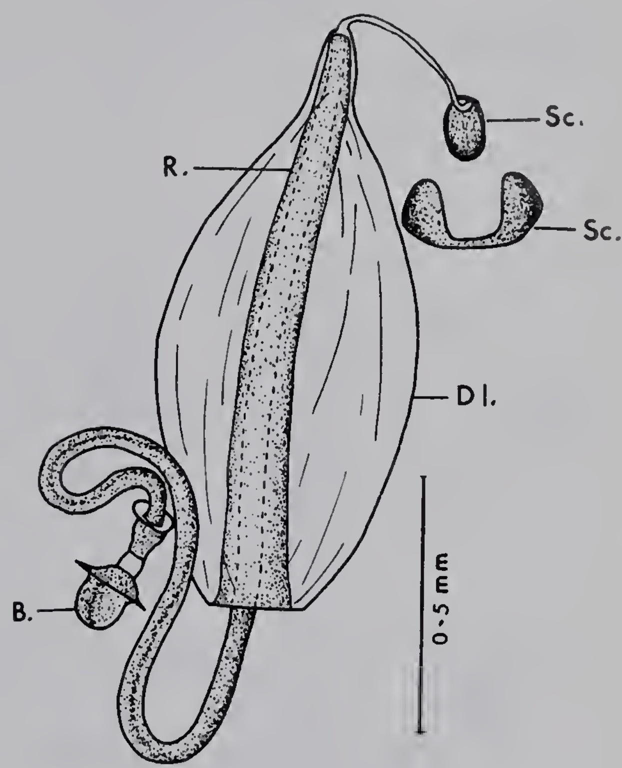

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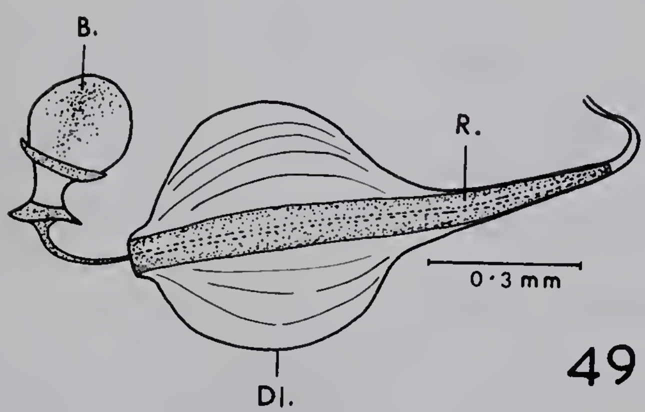

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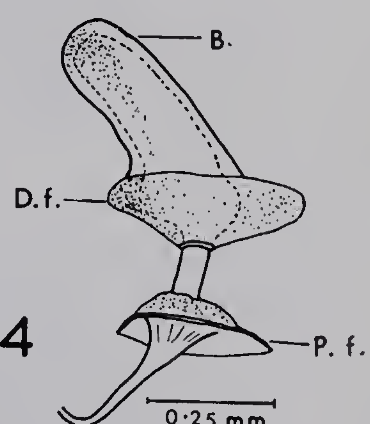

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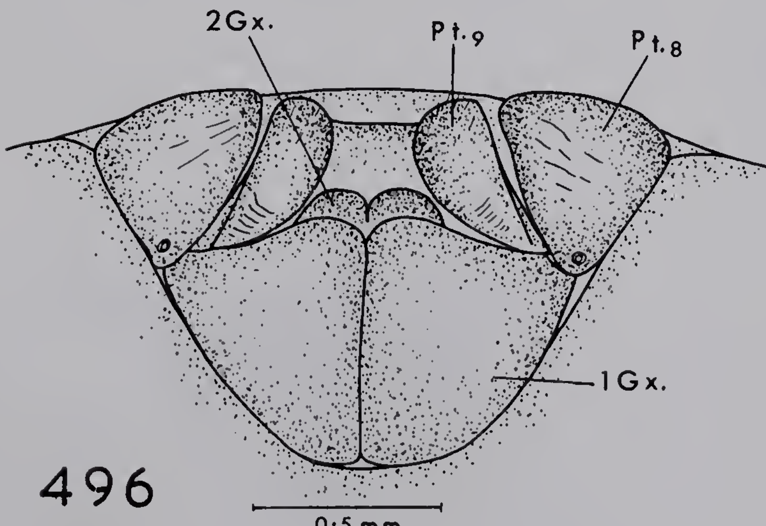

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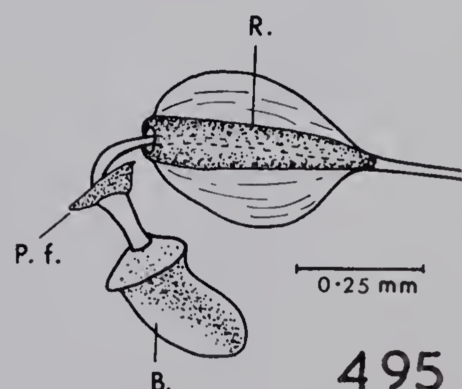

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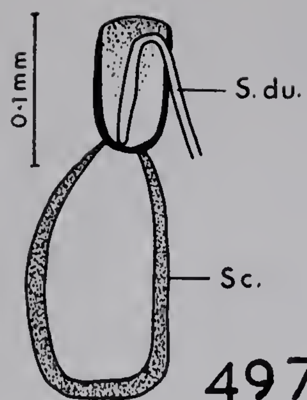
Fig. 497. *Zicrona caerulea*, sclerites around spermathecal opening.

Figs. 498 - 499. *Amaurochrous dubius*.
498, female genitalia, ventral view;
499, spermatheca.

Fig. 500. *Weda parvula*, spermathecal bulb.

Figs. 501 - 502. *Piezosternum subulatum*.
501, female genitalia, ventral view;
502, spermatheca.

Fig. 503. *Elasmostethus cruciatus*, female genitalia, ventral view.



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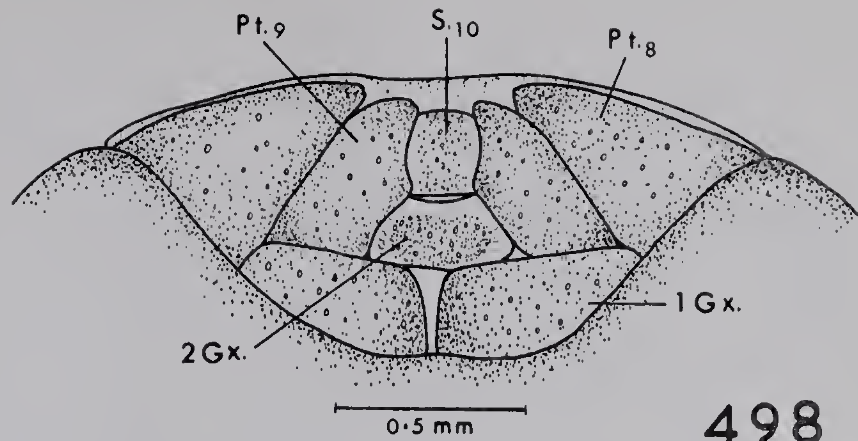

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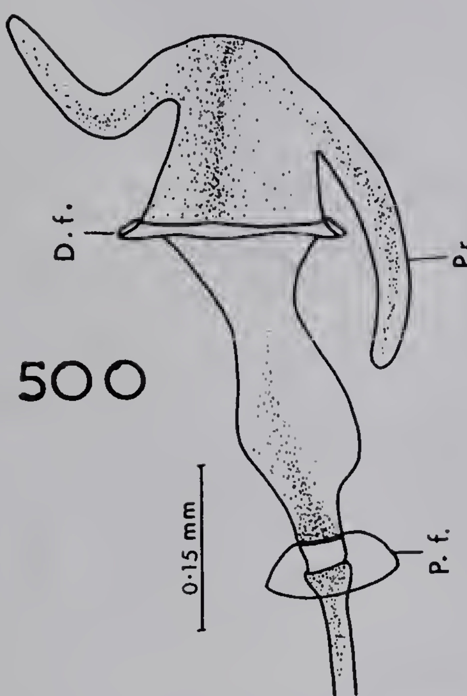

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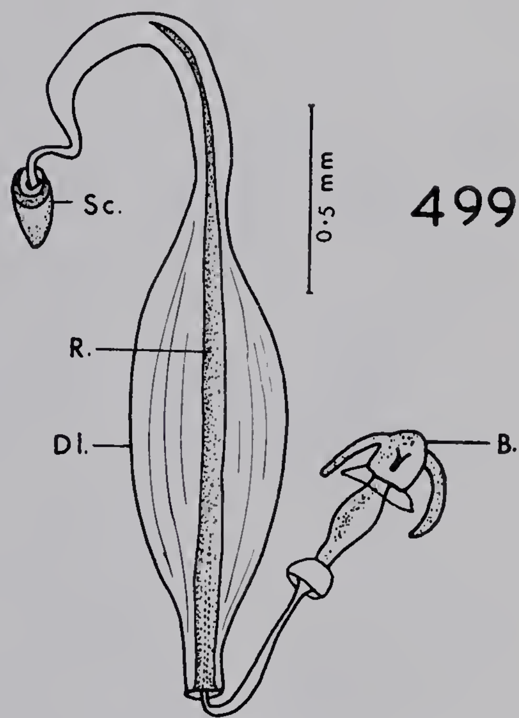

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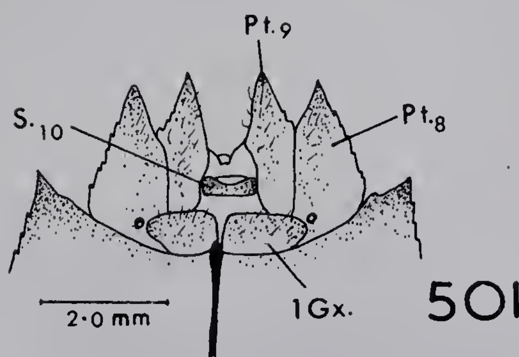

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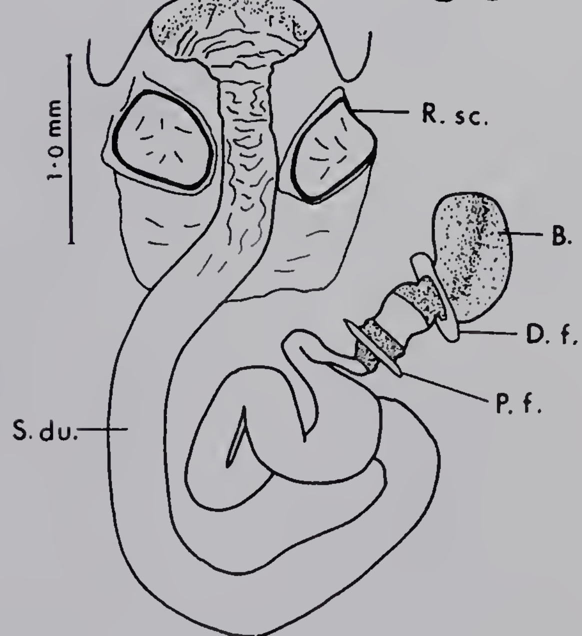

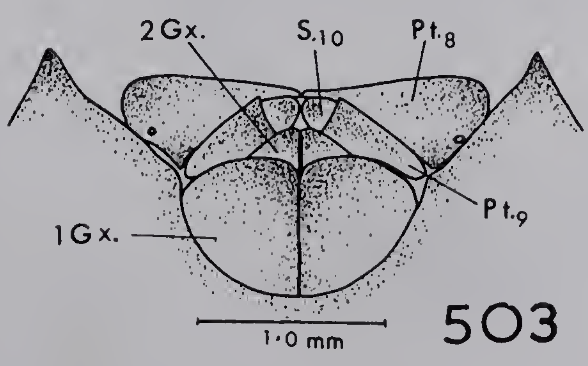

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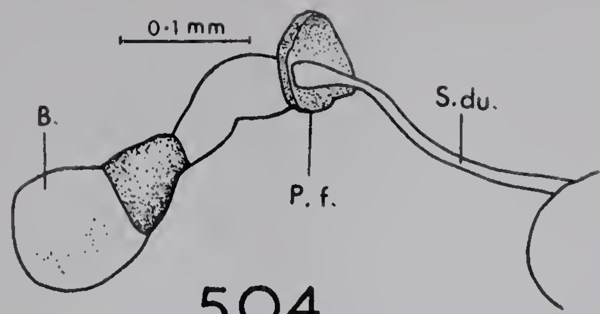
Fig. 504. _Elasmostethus_ _cruciatus_, spermatheca.

Fig. 505. _Elasmucha_ _lateralis_, spermatheca.

Figs. 506 - 507. _Corimelaena_ _pulicaria_. 506, female genitalia, ventral view; 507, spermatheca.

Figs. 508 - 509. _Galgupha_ _nitiduloides_. 508, spermatheca; 509, spermathecal bulb.

Fig. 510. _Dallasiellus_ _discrepans_, female genitalia, ventral view.



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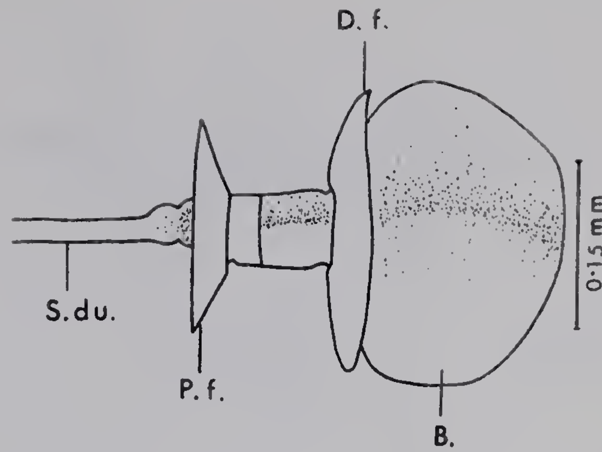

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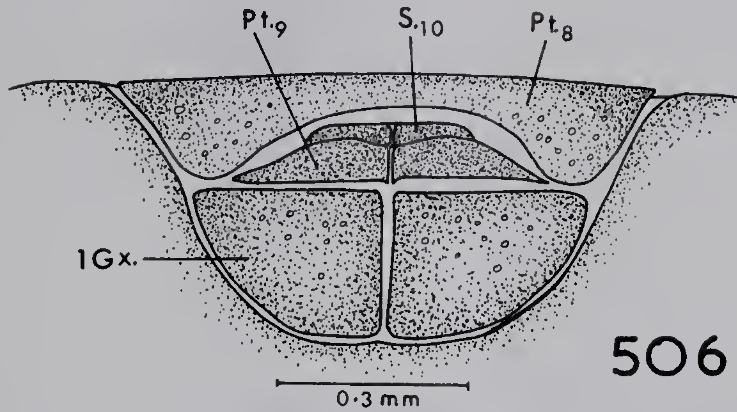

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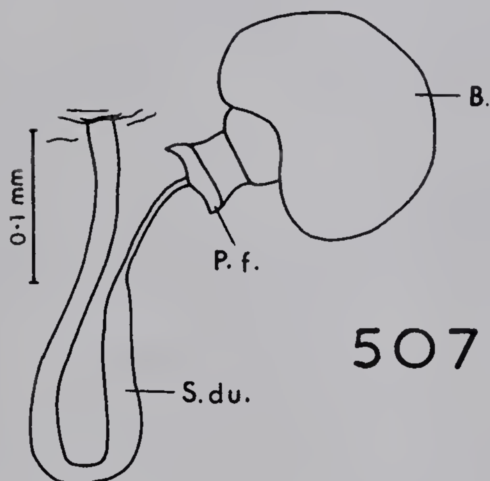

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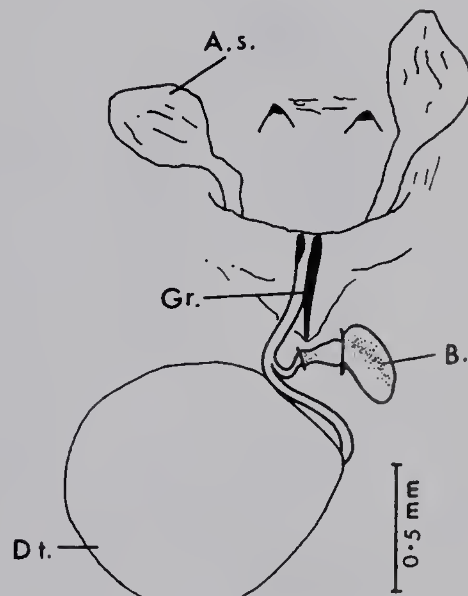

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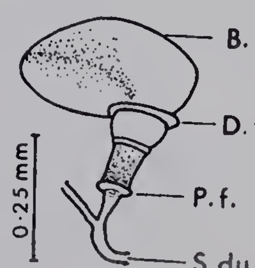

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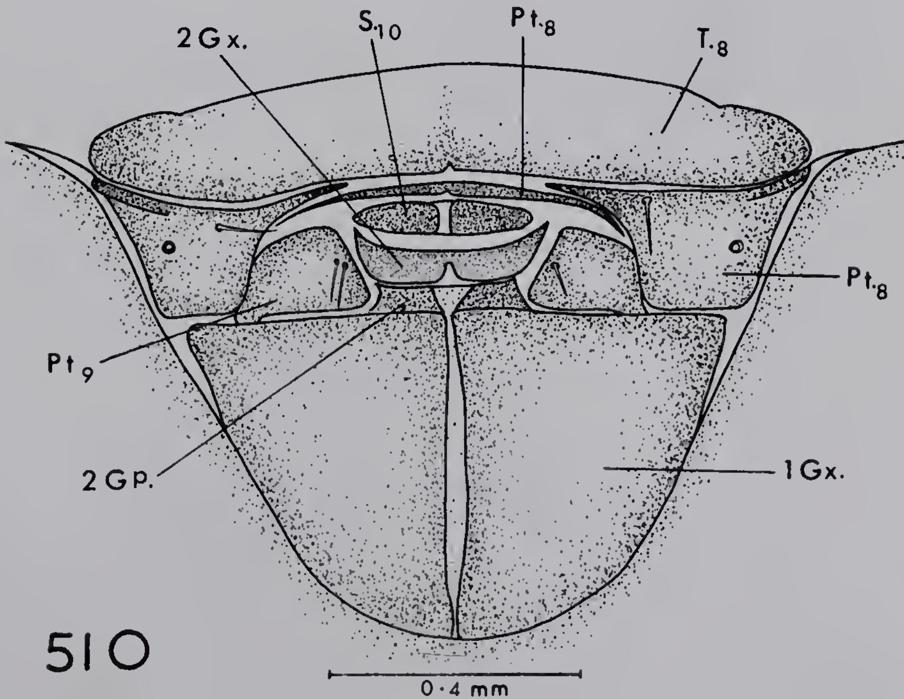


510

Fig. 511. Dallasiellus discrepans, spermatheca.

Fig. 512 - 513. Cyrtomenus crassus.

512, female genitalia, ventral view;

513, spermatheca.

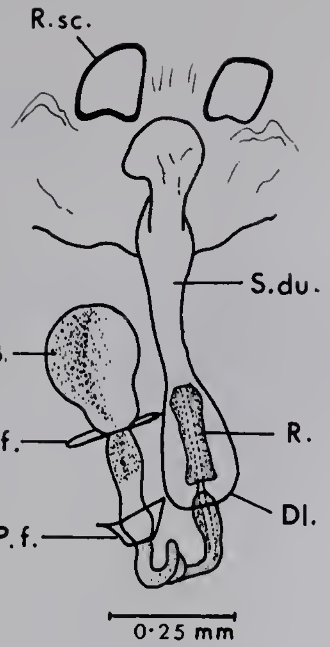
Fig. 514. Pangaeus aethiops, spermatheca.

Figs. 515 - 516. Amnestus pallidus.

515, female genitalia, ventral view;

516, spermatheca.

Fig. 517. Amnestus pusio, spermatheca.



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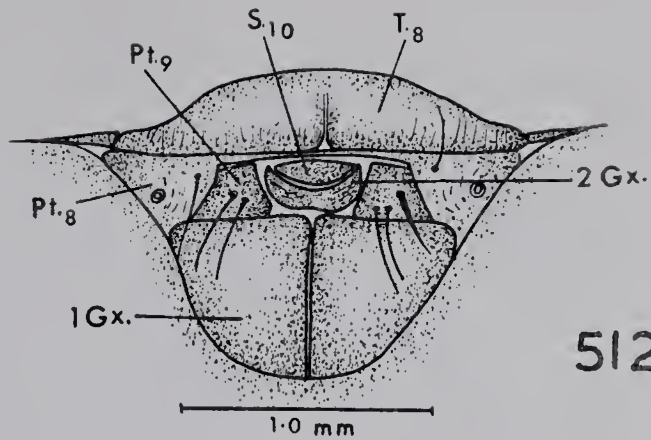

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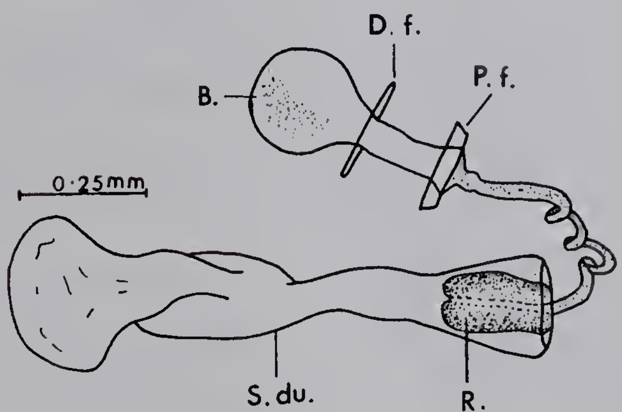

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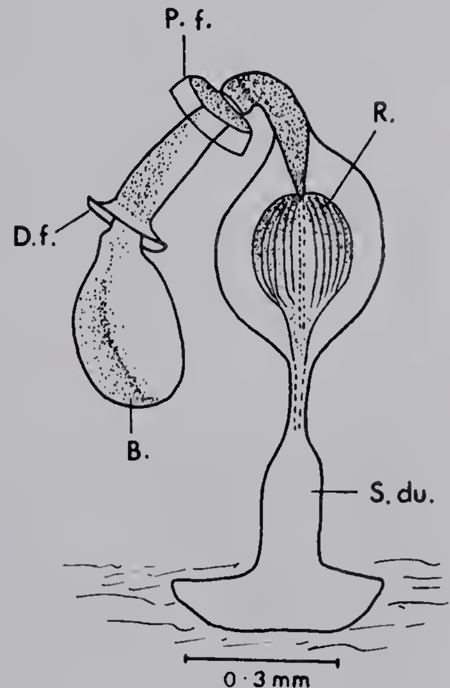

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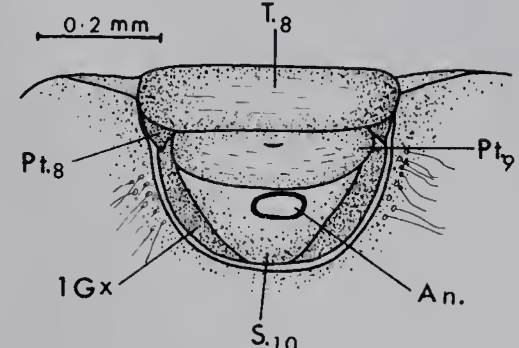

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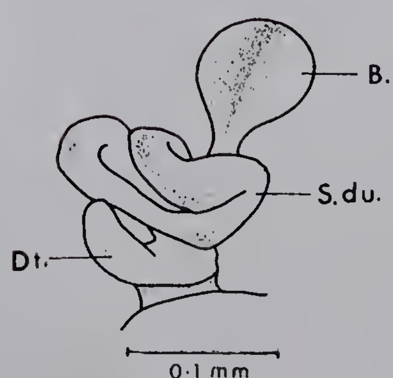

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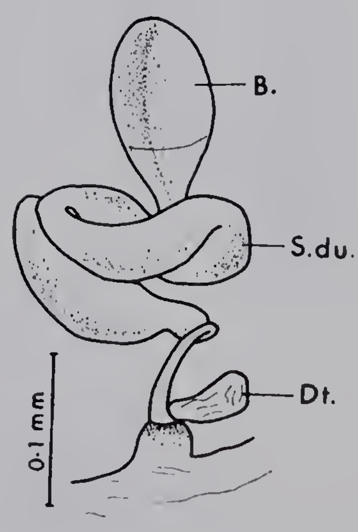


516

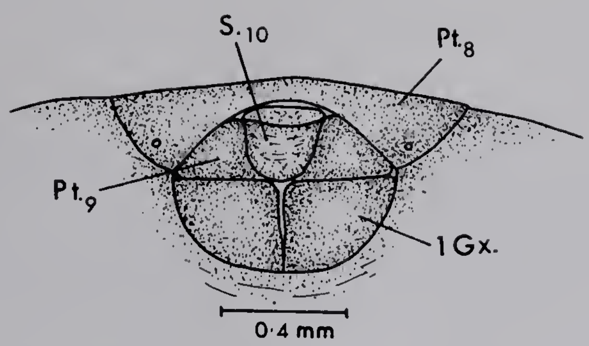
Figs. 518 - 519. _Sehirus cinctus_.

518, female genitalia, ventral view;

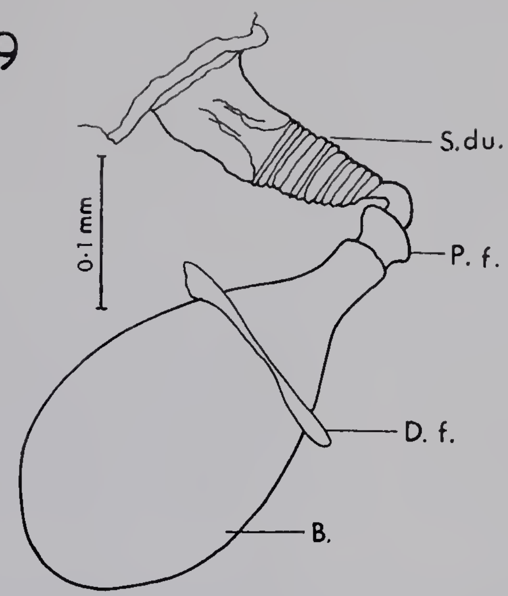
519, spermatheca.

Fig. 520. Graphical presentation of 11 male and female character differences existing between genera of North American Scutellerinae.

518


S.10
Pt.8
Pt.9
1 Gx.
0·4 mm

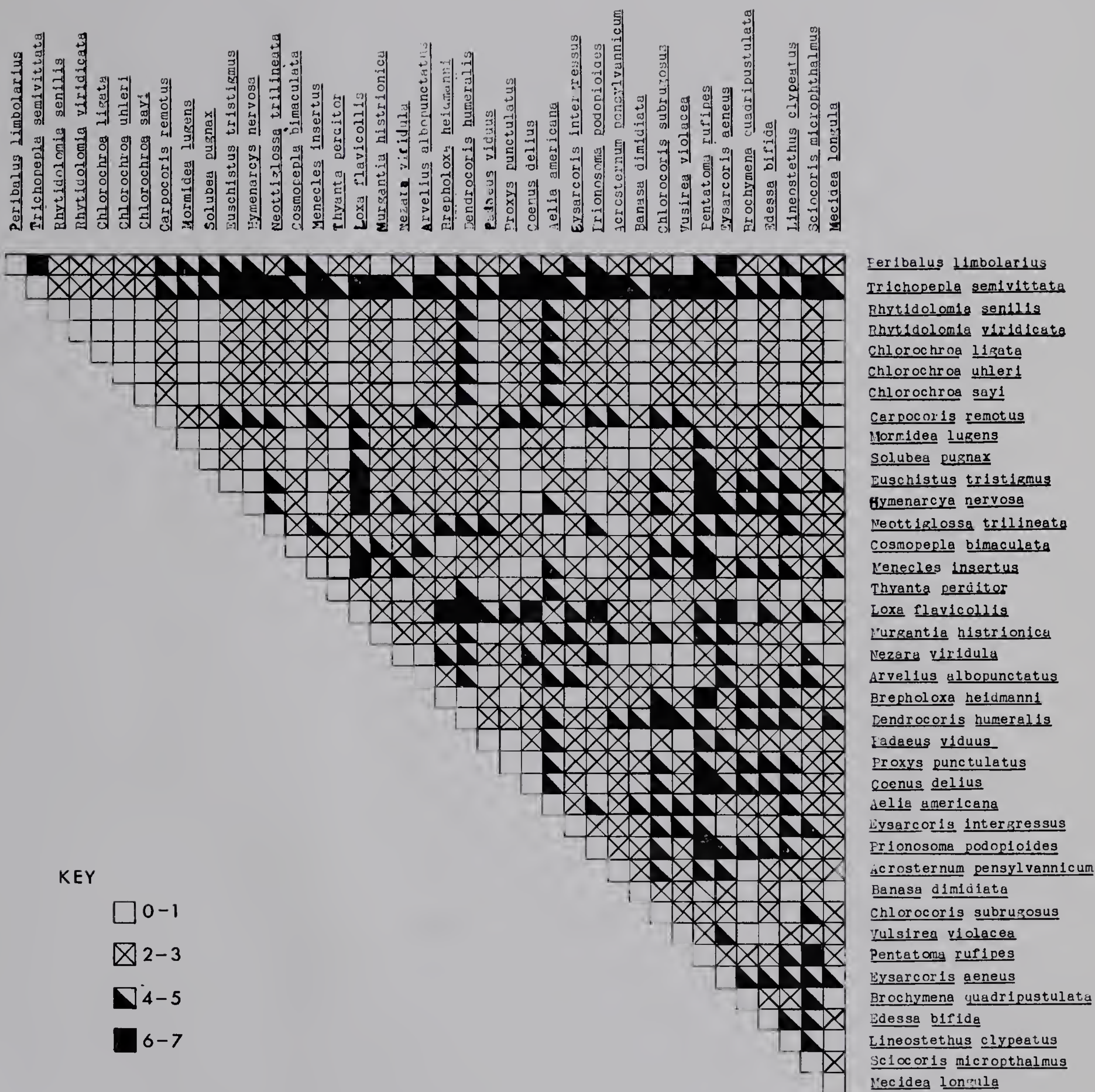
519


S.du.
0·1 mm
P. f.
D. f.
B.

520


Vanduzeeina balli
Rhimodera binotata
Euptychodera corrugata
Fokkeria producta
Eurygaster alternatus
Stethaulax marmoratus
Sphyrocoris obliquus
Homaemus aeneifrons
Diolcus irroratus
Tetyra antillarum
Pachycoris torridus
Acantholomidea porosa
Symphylus carribeanus
Chelysomidea guttata
Augocoris gomesii
KEY
0–2
3–5
6–8
9–11
12 and over

Fig. 521. Graphical presentation of 10 male and female character differences existing between genera of North American Pentatominae.


Peribalus limbolarius
Trichopepla semivittata
Rhytidolomia senilis
Rhytidolomia viridicata
Chlorochroa ligata
Chlorochroa uhleri
Chlorochroa sayi
Carpocoris remotus
Mormidea lugens
Solubea pugnax
Euschistus tristigmus
Hymenarcys nervosa
Neottiglossa trilineata
Cosmopepla bimaculata
Menecles insertus
Thyanta perditor
Loxa flavicollis
Murgantia histrionica
Nezara viridula
Arvelius albopunctatus
Brepholoxa heidmanni
Dendrocoris humeralis
Padaeus viduus
Proxys punctulatus
Coenus delius
Aelia americana
Eysarcoris intergressus
Prionosoma podopioides
Acrosternum pensylvannicum
Banasa dimidiata
Chlorocoris subrugosus
Vulsirea violacea
Pentatoma rufipes
Eysarcoris aeneus
Brochymena quadripustulata
Edessa bifida
Lineostethus clypeatus
Sciocoris micropthalmus
Mecidea longula
KEY
0-1
2-3
4-5
6-7